VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
*****
School of Computer Science and Engineering

ACADEMIC CURRICULUM

(BACHELOR OF SCIENCE DEGREES IN COMPUTER SCIENCE AND COMPUTER ENGINEERING)

2009

CONTENT

PREFACE

BACHELOR OF SCIENCE DEGREE PROGRAM
IN COMPUTER SCIENCE AND ENGINEERING

As a part of The International University (IU) – HCMC Vietnam National University, The School of Computer Science & Engineering (SCSE) offers international standard undergraduate programs leading to Bachelor Science degrees in Computer Science and Computer Engineering. All programs in SCSE are fully taught in English by qualified professors and lecturers.

The program of Computer Science (CS) covers an extensive range of topics in CS, from problem solving techniques, algorithm analysis and design methods, software development technologies to artificial intelligence, knowledge-based systems.

The program of Computer Engineering (CE) concerns with the design of computer systems for many industrial applications. Because a computer system consists of hardware and software components, the computer engineer must be knowledgeable in the design and management of both sites. The CE program covers the design and analyses of computer systems in applications ranging from information systems to process control systems, remote sensing systems, intelligence systems.

The CE program - major in Information Technology (IT) deals with all aspects in information systems administration and management. The program contains all essential courses in system and network administration, management and evaluation, to system planning and development.

Graduates from these programs:

- Are able to pursue a professional career in IT industry in Vietnam or abroad.
- Are equipped with essential and professional knowledge in their training field.
- Are able to take further study in higher degrees and continue their life-long learning.

The course layout of three degrees are attached below.

PART 1

I. Degree:

Bachelor of Science in Computer Engineering
Bachelor of Science in Computer Engineering – major in Information Technology
Bachelor of Science in Computer Science

II. Education Objectives:

The Bachelor of Science degree programs in Computer Science and Computer Engineering aim at the following points:

1. General purpose: Training IT engineers achieve international qualities credited by Vietnamese and overseas organizations, and able to efficient work in Vietnam and abroad.
2. Goal: Graduates have to have a good political qualification, manner, and health; have a basic and advanced knowledge of computer science and engineering; have the ability to do research, analyze and design computer systems to solve practical problems; have abilities of efficient and creative working; have abilities of pursuing life-long learning and professional development.
3. Career Opportunity: IT engineers in companies and organizations or pursuing a higher degree.

III. Learning Outcome:

From the above education objectives, graduates will have the following outcomes:

1. Knowledge:
    - Politics and Humanities
    - English
    - Computing: an ability to use the techniques, skills, and modern engineering and computing tools necessary for engineering practice
    - Professional:
        - an ability to identify, formulate, and solve engineering and computing problems
        - an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
        - an ability to design and conduct experiments, as well as to analyze and interpret data
2. Skill:
    - Communication: an ability to represent result and communicate effectively
    - Natural Science Applicability: an ability to apply knowledge of mathematics, science, and engineering
    - Team Working: an ability to function on multidisciplinary teams
    - Career Development: a recognition of the need for, and an ability to engage in life-long learning
3. Professional Ethic:
    - An understanding of professional and ethical responsibility
    - The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
4. Career Opportunity:

- IT engineers in factories, companies, organizations…
- Pursuing a higher degree in Vietnam or abroad

IV. Education Duration and Workload:

4 years (8 semester) – 144 credits

V. Academic Curricula:

5.1. Bachelor of Computer Engineering:

5.1.1. General Courses (50 credits)

No	Courses	Code	Credits C(T,P)	Term	Language
I	**Social Science**				
1	Humanities courses		10		Vietnamese
2	Academic English 1 & 2		8 (8,0)	1, 2	English
II	**Natural Science**				
3	Calculus 1	MA101	4 (4,0)	1	English
4	Calculus 2	MA102	4 (4,0)	2	English
5	Calculus 3	MA203	4 (4,0)	3	English
6	Physics 1	PH101	2 (2,0)	1	English
7	Physics 2	PH102	2 (2,0)	1	English
8	Physics 3	PH103	4 (3,1)	2	English
9	Physics 4	PH204	2 (2,0)	3	English
10	Chemistry for Engineers	CH101	4 (3,1)	1	English
III	**Military & Physical Education**				
11	Military Education	MP101	4	1-6	Vietnamese
12	Physical Education	PE106	6	1-6	Vietnamese

5.1.2. Core Courses (64 credits)

1	Differential Equation	MA206	4 (3,1)	4	English
2	Probability, Statistics & Random Process	MA205	3 (3,0)	5	English
3	Linear Algebra	MA208	2 (2, 0)	5	English
4	Introduction to Computing	IT101	3 (3,0)	1	English
5	C/C++ Programming in Unix	IT102	4 (3,1)	2	English
6	Critical Thinking	GE101	3(3,0)	2	English
7	Object-Oriented Programming	IT204	4 (3,1)	3	English
8	Data Structures and Algorithms	IT205	4 (3,1)	4	English
9	Principles of EE 1	IT206	4 (3,1)	3	English
10	Principles of EE 2	IT207	4 (3,1)	4	English
11	Digital Logic Design	IT208	4 (3,1)	3	English
12	Programming and Problem Solving (Matlab)	IT209	4 (3,1)	4	English
13	Electronics Devices	IT311	4 (3,1)	5	English
14	Computer Architecture	IT312	4 (3,1)	4	English

15	Systems and Signals	IT310	4 (3,1)	5	English
16	Software Engineering	IT314	3 (2,1)	5	English
17	Internship	IT315	3 (0,3)	5	English
18	Principle of Economics	BA__	3 (3,0)	7	English

5.1.3. Major Courses (32 credits)

1	Digital Electronics and Lab	IT416	4 (3,1)	6	English
2	Digital System Design	IT417	4 (3,1)	6	English
3	Operating Systems	IT313	4 (3,1)	6	English
4	Elective 1		4	7	English
5	Elective 2		4	7	English
6	Special Study of the Field	IT418	2(0,2)	7	English
7	Graduating Thesis	IT419	10(0,10)	8	English

Legend:

C : Credit
T : Theory (15 periods / unit)
P : Practice (30 periods / unit)

Internship is organized in the summer of the third year.

5.1.4. Elective Courses:

Elective courses (3 or 4 credits) can be changed subject to the requirements of industry and the availability of experts.

Courses		Code	Credits
1. Concepts in VLSI Design	:	IT451	4
2. Digital Signal Processing	:	IT452	4
3. Digital Signal Processing Design	:	IT453	4
4. Embedded Systems	:	IT454	4
5. Micro-processing Systems	:	IT455	4
6. Project Management	:	IT471	4
7. Discrete Mathematics	:	MA204	3

5.1.5. Distribution of Academic Curriculum:

No	Education	Credits	Percent %
1	General Courses	50	34.0%
2	Core Courses	65	44.2%
3	Major Courses of Computer Engineering	32	21.8%
	Total	147	100.0 %

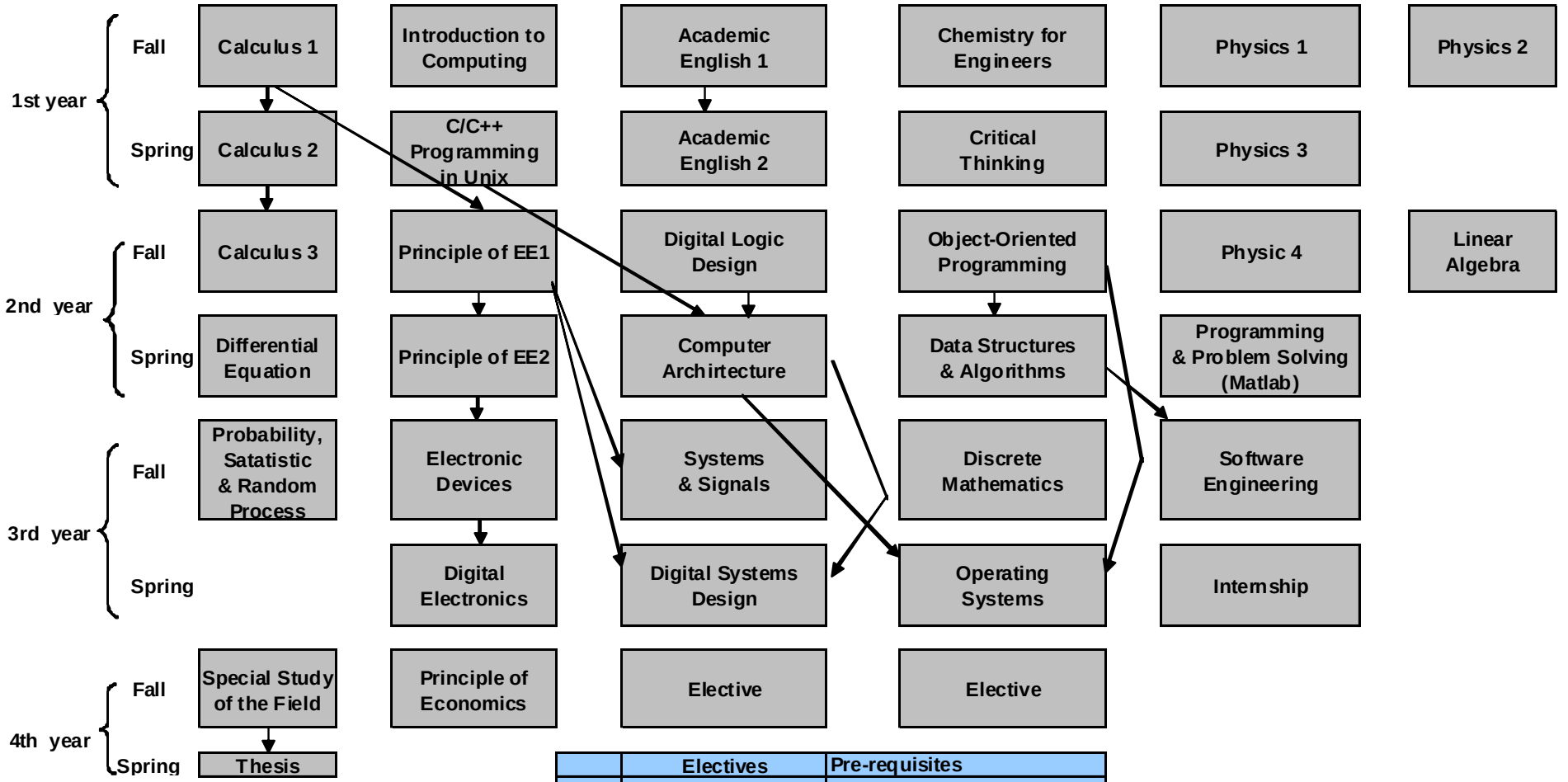
5.1.6. Distribution of Academic Curriculum to Terms:

No.	Year 1		Year 2		Year 3		Year 4	
	Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6	Semester 7	Semester 8
1	Calculus 1 (4)	Calculus 2 (4)	Calculus 3 (4)	Differential Equation (4)	Probability, Statistic & Random Process (3)	Digital System Design and Lab (4)	Special Study of the Field (2)	Senior Research Thesis (10)
2	Physics 1 (2)	Physics 3 and Lab (4)	Physics 4 and Lab (2)	Principles of EE 2 and Lab (4)	Electronics Devices and Lab (4)	Digital Electronics and Lab (4)	Principle of Economics (3)	
3	Physics 2 (2)	C/C++ Programming in Unix (4)	Digital Logic Design and Lab (4)	Programming & Problem Solving (Matlab) (4)	Software Engineering (3)	Signals & Systems and Lab (4)	Elective (4)	
4	Chemistry for Engineers (4)	Academic English 2 (4)	Principles of EE 1 and Lab (4)	Data Structures and Algorithms (4)	Operating Systems (4)	Physical Training 2 (3)	Elective (4)	
5	Academic English 1 (4)	Critical Thinking (3)	Object-Oriented Programming (4)	Computer Architecture (4)	Physical Training 1 (3)			
6	Introduction to Computing (3)		Linear Algebra (2)					
7								
No. of credits	19	19	20	20	17	15	13	10

Total number of credits = 147 credits (including 6 credits of Physical Training, 3 credits of Internship and 10 credits of Humanities)

5.1.7. Course Pre-requisite Chart:

Pre-requisite Chart for Bachelor in Computer Engineering



	Electives	Pre-requisites
1	Concepts in VLSI Design	Computer Architecture - Digital Electronics
2	Digital Signal Processi	Systems & Signals
3	DSP Design	Digital Signal Processing
4	Embedded Systems	Computer Architecture
5	Micro-Processing Sys	Electronic Devices
6	Discrete Math	

5.2. Bachelor of Computer Engineering – Major in Information Technology:

5.2.1. General Courses (50 credits)

No	Courses	Code	Credits C(T,P)	Term	Language
I	**Social Science**				
1	Humanities courses		10		Vietnamese
2	Academic English 1 & 2		8 (8,0)	1, 2	English
II	**Natural Science**				
3	Calculus 1	MA101	4 (4,0)	1	English
4	Calculus 2	MA102	4 (4,0)	2	English
5	Calculus 3	MA203	4 (4,0)	3	English
6	Physics 1	PH101	2 (2,0)	1	English
7	Physics 2	PH102	2 (2,0)	1	English
8	Physics 3	PH103	4 (3,1)	2	English
9	Physics 4	PH204	2 (2,0)	3	English
10	Chemistry for Engineers	CH101	4 (3,1)	1	English
III	**Military & Physical Education**				
11	Military Education	MP101	4	1-6	Vietnamese
12	Physical Education	PE106	6	1-6	Vietnamese

5.2.2. Core Courses (65 credits)

1	Discrete Mathematics	MA204	3 (3,0)	4	English
2	Probability, Statistics & Random Process	MA205	3 (3,0)	5	English
3	Introduction to Computing	IT101	3 (3,0)	1	English
4	C/C++ Programming in Unix	IT102	4 (3,1)	2	English
5	Critical Thinking	GE101	3(3,0)	2	English
6	Object-Oriented Programming	IT204	4 (3,1)	3	English
7	Data Structures and Algorithms	IT205	4 (3,1)	4	English
8	Theoretical Models in Computing	IT220	4 (3,1)	3	English
9	Principles of Database Management	IT221	4 (3,1)	4	English
10	Digital Logic Design	IT208	4 (3,1)	3	English
11	Object-Oriented Analysis and Design	IT222	4 (3,1)	4	English
12	Computer Architecture	IT312	4 (3,1)	4	English
13	Operating Systems	IT313	4 (3,1)	5	English
14	Software Engineering	IT314	3 (2,1)	5	English
15	Web Application Development	IT323	4 (3,1)	5	English
16	Computer Networks	IT324	4 (3,1)	5	English
17	Internship	IT315	3 (0,3)		English
18	Principle of Economics	BA__	3 (3,0)	7	English

5.2.3. Major Courses (32 credits)

1	Information System Management	IT425	4 (3,1)	6	English
2	Net-Centric Programming	IT426	4 (3,1)	6	English
3	Elective 1		4	6	English
4	Elective 2		4	7	English
5	Elective 3		4	7	English
6	Special Study of the Field	IT418	2(0,2)	7	English
7	Graduating Thesis	IT419	10(0,10)	8	English

Legend:

C : Credit
T : Theory (15 periods / unit)
P : Practice (30 periods / unit)

Internship is organized in the summer of the third year.

4.2.4. Elective Courses:

Elective courses (3 or 4 credits) can be changed subject to the requirements of industry and the availability of experts.

Courses	Code	Credits
1. Introduction to Distributed Computing:	IT461	4
2. System and Network Security :	IT462	4
3. Network Design and Evaluation :	IT463	4
4. Project Management :	IT471	4
5. User Interface Design and Evaluation:	IT473	4

5.2.5. Distribution of Academic Curriculum:

No	Education	Credits	Percent %
1	General Courses	50	34.0%
2	Core Courses	65	44.2%
3	Major Courses	32	21.8%
	Total	147	100.0 %

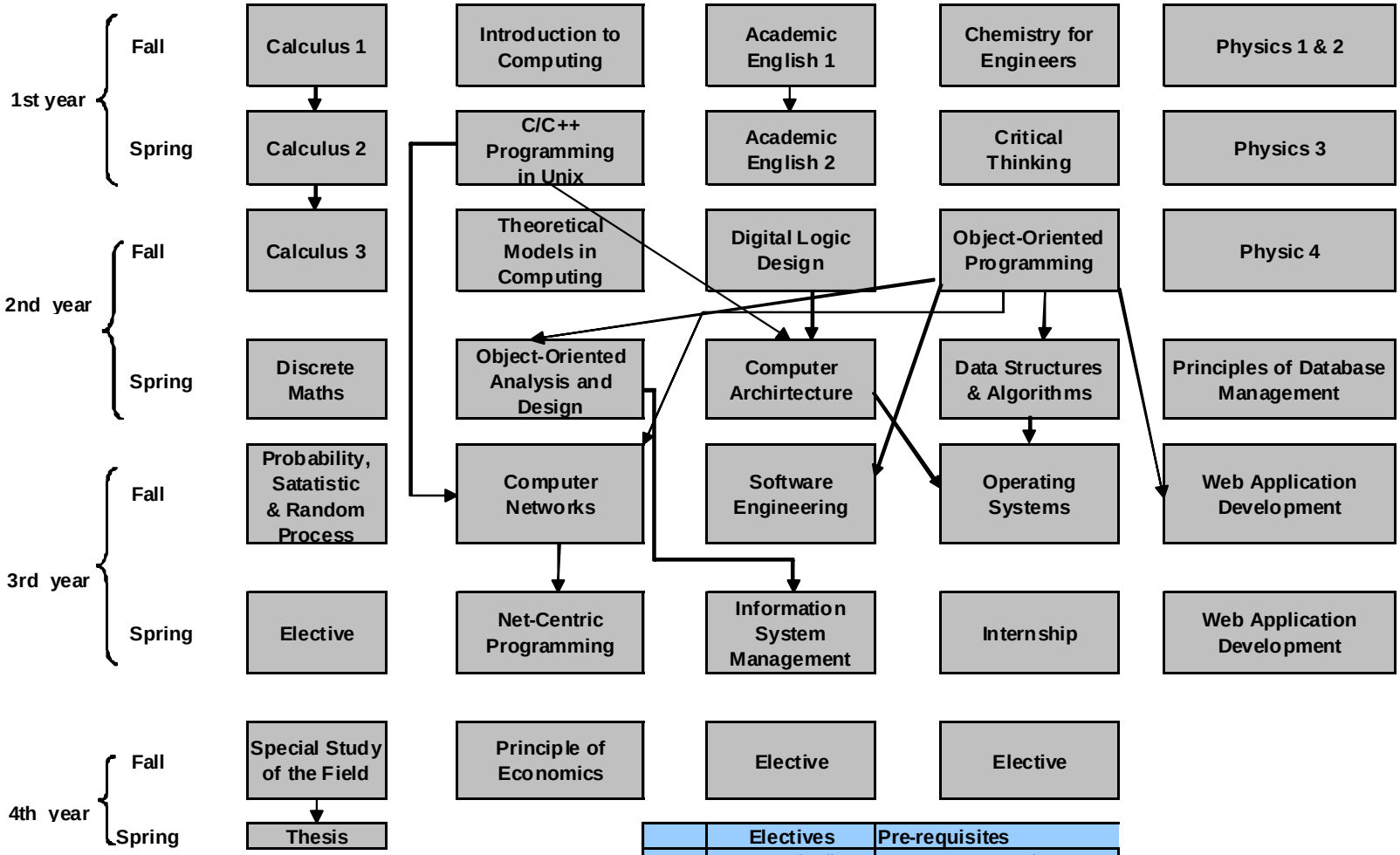
5.2.6. Distribution of Academic Curriculum to Terms:

No.	Year 1		Year 2		Year 3		Year 4	
	Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6	Semester 7	Semester 8
1	Calculus 1 (4)	Calculus 2 (4)	Calculus 3 (4)	Discrete Mathematics (3)	Probability, Statistic & Random Process (3)	Information System Management (4)	Special Study of the Field (2)	Senior Research Thesis (10)
2	Physics 1 (2)	Physics 3 and Lab (4)	Physics 4 and Lab (2)	Principles of Database Management (4)	Computer Networks (4)	Net-Centric Programming (4)	Principle of Economics (3)	
3	Physics 2 (2)	C/C++ Programming in Unix (4)	Digital Logic Design and Lab (4)	Object-Oriented Analysis and Design (4)	Web Application Development (4)	Elective (4)	Elective (4)	
4	Chemistry for Engineers (3)	Academic English 2 (4)	Theoretical Models in Computing (4)	Data Structures and Algorithms (4)	Software Engineering (3)	Physical Training 2 (3)	Elective (4)	
5	Academic English 1 (4)	Critical Thinking (3)	Object-Oriented Programming (4)	Computer Architecture (4)	Operating Systems (4)			
6	Introduction to Computing (3)				Physical Training 1 (3)			
7								
No. of credits	19	19	18	19	21	15	13	10

Total number of credits = 147 credits (including 6 credits of Physical Training, 3 credits of Internship and 10 credits of Humanities)

5.2.7. Course Pre-requisite Chart:

Pre-requisite Chart for Bachelor in Computer Engineering - Major in IT



	Electives	Pre-requisites
1	Intro. to Distributed	Computer Networks
2	System and Netwo	Computer Networks
3	Network Design and Evaluation	Computer Networks
4	Intro. to Wireless	Computer Networks
5	Project Management	Software Engineering
6	Interface Design and Evaluation	Object-Oriented Programming

5.3. Bachelor of Computer Science:

5.3.1. General Courses (50 credits)

No	Courses	Code	Credits C(T,P)	Term	Language
I	**Social Science**				
1	Humanities courses		10		Vietnamese
2	Academic English 1 & 2		8 (8,0)	1, 2	English
II	**Natural Science**				
3	Calculus 1	MA101	4 (4,0)	1	English
4	Calculus 2	MA102	4 (4,0)	2	English
5	Calculus 3	MA203	4 (4,0)	3	English
6	Physics 1	PH101	2 (2,0)	1	English
7	Physics 2	PH102	2 (2,0)	1	English
8	Physics 3	PH103	4 (3,1)	2	English
9	Physics 4	PH204	2 (2,0)	3	English
10	Chemistry for Engineers	CH101	4 (3,1)	1	English
III	**Military & Physical Education**				
11	Military Education	MP101	4	1-6	Vietnamese
12	Physical Education	PE106	6	1-6	Vietnamese

5.3.2. Core Courses (65 credits)

1	Discrete Mathematics	MA204	3 (3,0)	4	English
2	Probability, Statistics & Random Process	MA205	3 (3,0)	5	English
3	Introduction to Computing	IT101	3 (3,0)	1	English
4	C/C++ Programming in Unix	IT102	4 (3,1)	2	English
5	Critical Thinking	GE101	3(3,0)	2	English
6	Object-Oriented Programming	IT204	4 (3,1)	3	English
7	Data Structures and Algorithms	IT205	4 (3,1)	4	English
8	Theoretical Models in Computing	IT220	4 (3,1)	3	English
9	Principles of Database Management	IT221	4 (3,1)	4	English
10	Digital Logic Design	IT208	4 (3,1)	3	English
11	Object-Oriented Analysis and Design	IT222	4 (3,1)	4	English
12	Computer Architecture	IT312	4 (3,1)	4	English
13	Operating Systems	IT313	4 (3,1)	5	English
14	Software Engineering	IT314	3 (2,1)	5	English
15	Web Application Development	IT323	4 (3,1)	5	English
16	Computer Networks	IT324	4 (3,1)	5	English
17	Internship	IT315	3 (0,3)		English
18	Principle of Economics	BA__	3 (3,0)	7	English

5.3.3. Major Courses (32 credits)

1	Introduction to Artificial Intelligence	IT427	4 (3,1)	6	English
2	Principles of Programming Languages	IT428	4 (3,1)	5	English
3	Elective 1		4	6	English
4	Elective 2		4	7	English
5	Elective 3		4	7	English
6	Special Study of the Field	IT418	2(0,2)	7	English
7	Graduating Thesis	IT419	10(0,10)	8	English

Legend:

C : Credit
T : Theory (15 periods / unit)
P : Practice (30 periods / unit)

Internship is organized in the summer of the third year.

5.3.4. Elective Courses:

Elective courses (3 or 4 credits) can be changed subject to the requirements of industry and the availability of experts.

Courses		Code	Credits
1. Project Management	:	IT471	4
2. Computer Graphics	:	IT472	4
3. User Interface Design and Evaluation	:	IT473	4
4. Software Architecture	:	IT474	4
5. Information System Management	:	IT425	4
6. Network-Centric Programming	:	IT426	4

5.3.5. Distribution of Academic Curriculum:

No	Education	Credits	Percent %
1	General Courses	50	34.0%
2	Core Courses	65	44.2%
3	Major Courses	32	21.8%
	Total	147	100.0 %

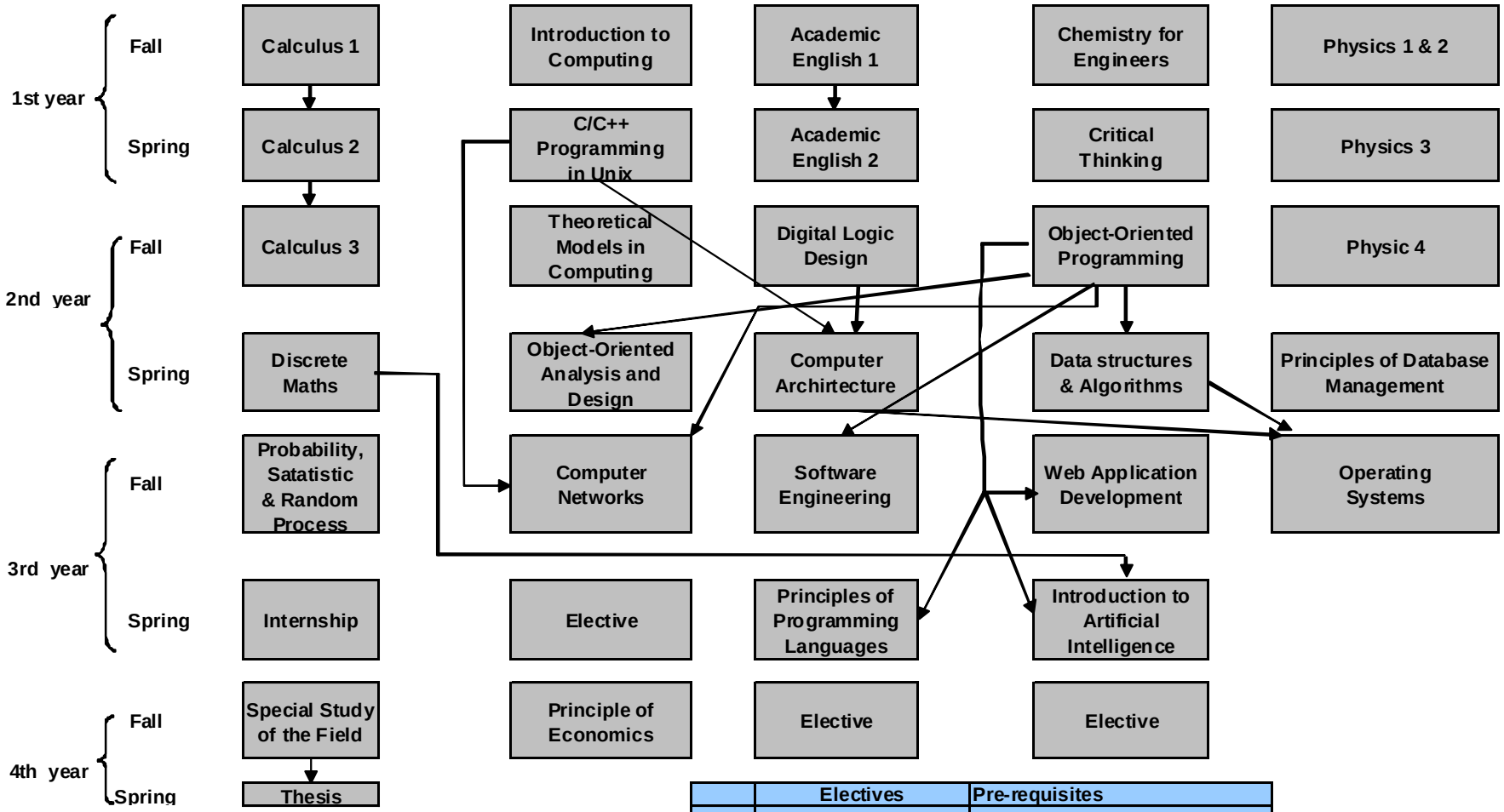
5.3.6. Distribution of Academic Curriculum to Terms:

No.	Year 1		Year 2		Year 3		Year 4	
	Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6	Semester 7	Semester 8
1	Calculus 1 (4)	Calculus 2 (4)	Calculus 3 (4)	Discrete Mathematics (3)	Probability, Statistic & Random Process (3)	Introduction to Artificial Intelligence (4)	Special Study of the Field (2)	Senior Research Thesis (10)
2	Physics 1 (2)	Physics 3 and Lab (4)	Physics 4 and Lab (2)	Principles of Database Management (4)	Web Application Development (4)	Principles of Programming Languages (4)	Principle of Economics (3)	
3	Physics 2 (2)	C/C++ Programming in Unix (4)	Digital Logic Design and Lab (4)	Object-Oriented Analysis and Design (4)	Computer Networks (4)	Elective (4)	Elective (4)	
4	Chemistry for Engineers (3)	Academic English 2 (4)	Theoretical Models in Computing (4)	Data Structures and Algorithms (4)	Software Engineering (3)	Physical Training 2 (3)	Elective (4)	
5	Academic English 1 (4)	Critical Thinking (3)	Object-Oriented Programming (4)	Computer Architecture (4)	Operating Systems (4)			
6	Introduction to Computing (3)				Physical Training 1 (3)			
7								
No. of credits	19	19	18	19	21	15	13	10

Total number of credits = 147 credits (including 6 credits of Physical Training, 3 credits of Internship and 10 credits of Humanities)

5.3.7. Course Pre-requisite Chart:

Pre-requisite Chart for Bachelor in Computer Science



	Electives	Pre-requisites
1	Project Management	Software Engineering
2	Computer Graphics	Object-Oriented Programming
3	Interface Design and Evaluation	Object-Oriented Programming
4	Software Architecture	Object-Oriented Analysis &
5	Information System	Object-Oriented Analysis &
6	Net-Centric Programming	Computer Networks

PART 2

VI. Recommended Course Distribution for Different English Levels

SCSE - Computer Engineering 06 - (Toefl >= 500 và Toefl >= 430)

Subject	Credits	Subject	Credits
Semester 1	**24**	**Semester 5**	**21**
Basic Electrical Concepts & Circuits	3	Introduction to Computing	3
Basic Programming (C++)	4	Chemistry for Engineers	4
Calculus 1	4	Physics 1	2
Philosophy	6	Physics 2	2
Physics	3	Critical Thinking	3
Academic English 1	4	Object-Oriented Programming	4
		Process	3
Semester 2	**24**	**Semester 6**	**24**
Circuit Analysis	3	Physics 4	2
Algorithms & Data Structures	4	Electronic Devices	4
Calculus 2	4	Software Engineering	3
Engineering Math for IT	4	Digital System Design	4
Political Economy	5	Digital Electronics	4
Academic English 2	4	Programming and Problem Solving (Matlab)	4
		Physical Training 2	3
Summer Semester 1	**3**	**Summer Semester 3**	**3**
		Internship	3
Semester 3	**21**	**Semester 7**	**11**
Digital Logic Design	4	Special Study of the Field	2
Computer Architecture	3	Principle of Economics	3
Database	4	Elective	3
Discrete Mathematics	3	Elective	3
Science Socialism	4		
Physical Training 1	3		
Semester 4	**26**	**Semester 8**	**10**
Signals & Systems	4	Thesis	10
Programming Languages & Translators	3		
Operating Systems	4		
Object Oriented Data Engineering (Java)	4		
Microprocessor Systems & Interfacing	4		
Numerical Methods	3		
History of Vietnamese Communist Party	4		

Total of Academic Credits **164**

SCSE - Computer Engineering 06 -
Information Technology Major - (Toefl >= 500 và Toefl >= 430)

Subject	Credits	Subject	Credits
Semester 1	**24**	**Semester 5**	**21**
Basic Electrical Concepts & Circuits	3	Introduction to Computing	3
Basic Programming (C++)	4	Chemistry for Engineers	4
Calculus 1	4	Physics 1	2
Philosophy	6	Physics 2	2
Physics	3	Critical Thinking	3
Academic English 1	4	Object-Oriented Programming	4
		Process	3
Semester 2	**24**	**Semester 6**	**24**
Circuit Analysis	3	Physics 4	2
Algorithms & Data Structures	4	Computer Networks	4
Calculus 2	4	Software Engineering	3
Engineering Math for IT	4	Information System Management	4
Political Economy	5	Net-Centric Programming	4
Academic English 2	4	Web Application Development	4
		Physical Training 2	3
Summer Semester 1	**3**	**Summer Semester 3**	**3**
		Internship	3
Semester 3	**21**	**Semester 7**	**11**
Digital Logic Design	4	Special Study of the Field	2
Computer Architecture	3	Principle of Economics	3
Database	4	Elective	3
Discrete Mathematics	3	Elective	3
Science Socialism	4		
Physical Training 1	3		
Semester 4	**26**	**Semester 8**	**10**
Signals & Systems	4	Thesis	10
Programming Languages & Translators	3		
Operating Systems	4		
Object Oriented Data Engineering (Java)	4		
Microprocessor Systems & Interfacing	4		
Numerical Methods	3		
History of Vietnamese Communist Party	4		

Total of Academic Credits **164**

SCSE - Computer Engineering 06 -
Software Engineering Major - (Toefl >= 500 và Toefl >= 430)

Subject	Credits	Subject	Credits
Semester 1	**24**	**Semester 5**	**21**
Basic Electrical Concepts & Circuits	3	Introduction to Computing	3
Basic Programming (C++)	4	Chemistry for Engineers	4
Calculus 1	4	Physics 1	2
Philosophy	6	Physics 2	2
Physics	3	Critical Thinking	3
Academic English 1	4	Object-Oriented Programming	4
		Process	3
Semester 2	**24**	**Semester 6**	**24**
Circuit Analysis	3	Physics 4	2
Algorithms & Data Structures	4	Computer Networks	4
Calculus 2	4	Software Engineering	3
Engineering Math for IT	4	Intro to Aritificial Intelligence	4
Political Economy	5	Principles of Programming Languagues	4
Academic English 2	4	Web Application Development	4
		Physical Training 2	3
Summer Semester 1	**3**	**Summer Semester 3**	**3**
		Internship	3
Semester 3	**21**	**Semester 7**	**11**
Digital Logic Design	4	Special Study of the Field	2
Computer Architecture	3	Principle of Economics	3
Database	4	Elective	3
Discrete Mathematics	3	Elective	3
Science Socialism	4		
Physical Training 1	3		
Semester 4	**26**	**Semester 8**	**10**
Signals & Systems	4	Thesis	10
Programming Languages & Translators	3		
Operating Systems	4		
Object Oriented Data Engineering (Java)	4		
Microprocessor Systems & Interfacing	4		
Numerical Methods	3		
History of Vietnamese Communist Party	4		

Total of Academic Credits **164**

SCSE - Computer Engineering 06 - (Toefl < 430)

Subject	Credits	Subject	Credits
Semester 1	**32**	**Semester 5**	**21**
Intensive English 1	32	Introduction to Computing	3
		Chemistry for Engineers	4
		Physics 1	2
		Physics 2	2
		Critical Thinking	3
		Object-Oriented Programming	4
		Process	3
Semester 2	**34**	**Semester 6**	**24**
Basic Electrical Concepts & Circuits	3	Physics 4	2
Basic Programming (C++)	4	Electronic Devices	4
Calculus 1	4	Software Engineering	3
Philosophy	6	System and Signals	4
Physics	3	Digital Electronics	4
Engineering Maths	2	Programming and Problem Solving (Matlab)	4
Intensive English 2	12	Physical Training 2	3
Summer Semester 1	**9**	**Summer Semester 3**	**3**
Algorithms & Data Structures	4	Internship	3
Political Economy	5		
Semester 3	**29**	**Semester 7**	**15**
Calculus 2	4	Digital System Design	4
Digital Logic Design	4	Special Study of the Field	2
Computer Architecture	3	Principle of Economics	3
Database	4	Elective	3
Discrete Mathematics	3	Elective	3
Science Socialism	4		
Physical Training 1	3		
Academic 1	4		
Semester 4	**30**	**Semester 8**	**10**
Signals & Systems	4	Thesis	10
Programming Languages & Translators	3		
Operating Systems	4		
Object Oriented Data Engineering (Java)	4		
Microprocessor Systems & Interfacing	4		
Numerical Methods	3		
History of Vietnamese Communist Party	4		
Academic 2	4		

Total of Academic Credits **163**

SCSE - Computer Engineering 06 -
Information Technology Major - (Toefl < 430)

Subject	Credits	Subject	Credits
Semester 1	**32**	**Semester 5**	**21**
Intensive English 1	32	Introduction to Computing	3
		Chemistry for Engineers	4
		Physics 1	2
		Physics 2	2
		Critical Thinking	3
		Object-Oriented Programming	4
		Process	3
Semester 2	**34**	**Semester 6**	**24**
Basic Electrical Concepts & Circuits	3	Physics 4	2
Basic Programming (C++)	4	Computer Networks	4
Calculus 1	4	Software Engineering	3
Philosophy	6	Information System Management	4
Physics	3	Net-Centric Programming	4
Engineering Maths	2	Web Application Development	4
Intensive English 2	12	Physical Training 2	3
Summer Semester 1	**9**	**Summer Semester 3**	**3**
Algorithms & Data Structures	4	Internship	3
Political Economy	5		
Semester 3	**29**	**Semester 7**	**11**
Calculus 2	4	Special Study of the Field	2
Digital Logic Design	4	Principle of Economics	3
Computer Architecture	3	Elective	3
Database	4	Elective	3
Discrete Mathematics	3		
Science Socialism	4		
Physical Training 1	3		
Academic 1	4		
Semester 4	**30**	**Semester 8**	**10**
Signals & Systems	4	Thesis	10
Programming Languages & Translators	3		
Operating Systems	4		
Object Oriented Data Engineering (Java)	4		
Microprocessor Systems & Interfacing	4		
Numerical Methods	3		
History of Vietnamese Communist Party	4		
Academic 2	4		

Total of Academic Credits **159**

SCSE - Computer Engineering 06 -
Software Engineering Major - (Toefl < 430)

Subject	Credits	Subject	Credits
Semester 1	**32**	**Semester 5**	**21**
Intensive English 1	32	Introduction to Computing	3
		Chemistry for Engineers	4
		Physics 1	2
		Physics 2	2
		Critical Thinking	3
		Object-Oriented Programming	4
		Process	3
Semester 2	**34**	**Semester 6**	**24**
Basic Electrical Concepts & Circuits	3	Physics 4	2
Basic Programming (C++)	4	Computer Networks	4
Calculus 1	4	Software Engineering	3
Philosophy	6	Intro to Aritificial Intelligence	4
Physics	3	Principles of Programming Languagues	4
Engineering Maths	2	Web Application Development	4
Intensive English 2	12	Physical Training 2	3
Summer Semester 1	**9**	**Summer Semester 3**	**3**
Algorithms & Data Structures	4	Internship	3
Political Economy	5		
Semester 3	**29**	**Semester 7**	**11**
Calculus 2	4	Special Study of the Field	2
Digital Logic Design	4	Principle of Economics	3
Computer Architecture	3	Elective	3
Database	4	Elective	3
Discrete Mathematics	3		
Science Socialism	4		
Physical Training 1	3		
Academic 1	4		
Semester 4	**30**	**Semester 8**	**10**
Signals & Systems	4	Thesis	10
Programming Languages & Translators	3		
Operating Systems	4		
Object Oriented Data Engineering (Java)	4		
Microprocessor Systems & Interfacing	4		
Numerical Methods	3		
History of Vietnamese Communist Party	4		
Academic 2	4		

Total of Academic Credits **159**

SCSE - Computer Engineering 07 - (Toefl >= 500)

Subject	Credits	Subject	Credits
Semester 1	**24**	**Semester 5**	**18**
Basic Electrical Concepts & Circuits	3	Probability, Statistic & Random Process	3
Basic Programming (C++)	4	Operating Systems	4
Calculus 1	4	Electronic Devices	4
Philosophy	6	System and Signals	4
Physics	3	Software Engineering	3
Academic English 1	4		
Semester 2	**24**	**Semester 6**	**14**
Circuit Analysis	3	Digital System Design	4
Algorithms & Data Structures	4	Digital Electronics	4
Calculus 2	4	Elective	3
Engineering Math for IT	4	Physical Training 2	3
Political Economy	5		
Academic English 2	4		
Summer Semester 1		**Summer Semester 3**	**3**
		Internship	3
Semester 3	**22**	**Semester 7**	**11**
Introduction to Computing	3	Special Study of the Field	2
Chemistry for Engineers	4	Principle of Economics	3
Physics 1	2	Elective	3
Physics 2	2		
Critical Thinking (3)	3		
Digital Logic Design	4		
Object-Oriented Programming	4		
Semester 4	**20**	**Semester 8**	**10**
Physics 4	2	Thesis	10
Discrete Mathematics	3		
Computer Architecture	4		
Programming and Problem Solving (Matlab)	4		
Physical Training 1	3		
Differential Equations	4		

Total of Academic Credits **135**
Credits of Humanities **10**

SCSE - Computer Engineering 07 -
Information Technology Major - (Toefl >= 500)

Subject	Credits	Subject	Credits
Semester 1	**24**	**Semester 5**	**18**
Basic Electrical Concepts & Circuits	3	Probability, Statistic & Random Process	3
Basic Programming (C++)	4	Operating Systems	4
Calculus 1	4	Computer Networks	4
Philosophy	6	Web Application Development	4
Physics	3	Software Engineering	3
Academic English 1	4		
Semester 2	**24**	**Semester 6**	**14**
Circuit Analysis	3	Information System Management	4
Algorithms & Data Structures	4	Net-Centric Programming	4
Calculus 2	4	Elective	3
Engineering Math for IT	4	Physical Training 1	3
Political Economy	5		
Academic English 2	4		
Summer Semester 1		**Summer Semester 3**	**3**
		Internship	3
Semester 3	**22**	**Semester 7**	**11**
Introduction to Computing	3	Special Study of the Field	2
Chemistry for Engineers	4	Principle of Economics	3
Physics 1	2	Elective	3
Physics 2	2	Physical Training 2	3
Critical Thinking (3)	3		
Digital Logic Design	4		
Object-Oriented Programming	4		
Semester 4	**21**	**Semester 8**	**10**
Physics 4	2	Thesis	10
Discrete Mathematics	3		
Computer Architecture	4		
Object-Oriented Analysis and Design	4		
Principles of Database Management	4		
Theoretical Models in Computing	4		

Total of Academic Credits **136**
Credits of Humanities **10**

SCSE - Computer Science 07 (Toefl >= 500)

Subject	Credits	Subject	Credits
Semester 1	**24**	**Semester 5**	**18**
Basic Electrical Concepts & Circuits	3	Probability, Statistic & Random Process	3
Basic Programming (C++)	4	Operating Systems	4
Calculus 1	4	Computer Networks	4
Philosophy	6	Web Application Development	4
Physics	3	Software Engineering	3
Academic English 1	4		
Semester 2	**24**	**Semester 6**	**14**
Circuit Analysis	3	Intro to Aritificial Intelligence	4
Algorithms & Data Structures	4	Principles of Programming Languagues	4
Calculus 2	4	Elective	3
Engineering Math for IT	4	Physical Training 1	3
Political Economy	5		
Academic English 2	4		
Summer Semester 1		**Summer Semester 3**	**3**
		Internship	3
Semester 3	**22**	**Semester 7**	**11**
Introduction to Computing	3	Special Study of the Field	2
Chemistry for Engineers	4	Principle of Economics	3
Physics 1	2	Elective	3
Physics 2	2	Physical Training 2	3
Critical Thinking (3)	3		
Digital Logic Design	4		
Object-Oriented Programming	4		
Semester 4	**21**	**Semester 8**	**10**
Physics 4	2	Thesis	10
Discrete Mathematics	3		
Computer Architecture	4		
Object-Oriented Analysis and Design	4		
Principles of Database Management	4		
Theoretical Models in Computing	4		

Total of Academic Credits **136**
Credits of Humanities **10**

SCSE - Computer Engineering 07 - (500 > Toefl >= 430)

Subject	Credits	Subject	Credits
Semester 1	**29**	**Semester 5**	**21**
Basic Electrical Concepts & Circuits	3	Probability, Statistic & Random Process	3
Basic Programming (C++)	4	Operating Systems	4
Calculus 1	4	Electronic Devices	4
Philosophy	6	System and Signals	4
Intensive English 2	12	Software Engineering	3
		Physical Training 1	3
Semester 2	**27**	**Semester 6**	**14**
Circuit Analysis	3	Digital System Design	4
Algorithms & Data Structures	4	Digital Electronics	4
Calculus 2	4	Elective	3
Engineering Math for IT	4	Physical Training 2	3
Political Economy	5		
Academic English 1	4		
Physics	3		
Summer Semester 1		**Summer Semester 3**	**3**
		Internship	3
Semester 3	**22**	**Semester 7**	**11**
Introduction to Computing	3	Special Study of the Field	2
Chemistry for Engineers	4	Principle of Economics	3
Physics 1	2	Elective	3
Physics 2	2	Elective	3
Critical Thinking (3)	3		
Digital Logic Design	4		
Object-Oriented Programming	4		
Semester 4	**21**	**Semester 8**	**10**
Physics 4	2	Thesis	10
Discrete Mathematics	3		
Computer Architecture	4		
Programming and Problem Solving (Matlab)	4		
Academic English 2	4		
Differential Equations	4		

Total of Academic Credits **135**
Credits of Humanities **10**

SCSE - Computer Engineering 07 -
Information Technology Major - (500 > Toefl >= 430)

Subject	Credits	Subject	Credits
Semester 1	**29**	**Semester 5**	**21**
Basic Electrical Concepts & Circuits	3	Probability, Statistic & Random Process	3
Basic Programming (C++)	4	Operating Systems	4
Calculus 1	4	Computer Networks	4
Philosophy	6	Web Application Development	4
Intensive English 2	12	Software Engineering	3
		Physical Training 1	3
Semester 2	**27**	**Semester 6**	**18**
Circuit Analysis	3	Information System Management	4
Algorithms & Data Structures	4	Net-Centric Programming	4
Calculus 2	4	Elective	3
Engineering Math for IT	4	Physical Training 2	3
Political Economy	5	Academic English 2	4
Academic English 1	4		
Physics	3		
Summer Semester 1		**Summer Semester 3**	**3**
		Internship	3
Semester 3	**22**	**Semester 7**	**8**
Introduction to Computing	3	Special Study of the Field	2
Chemistry for Engineers	4	Principle of Economics	3
Physics 1	2	Elective	3
Physics 2	2		
Critical Thinking (3)	3		
Digital Logic Design	4		
Object-Oriented Programming	4		
Semester 4	**21**	**Semester 8**	**10**
Physics 4	2	Thesis	10
Discrete Mathematics	3		
Computer Architecture	4		
Object-Oriented Analysis and Design	4		
Principles of Database Management	4		
Theoretical Models in Computing	4		

Total of Academic Credits **136**
Credits of Humanities **10**

SCSE - Computer Science 07 (500 > Toefl >= 430)

Subject	Credits	Subject	Credits
Semester 1	**29**	**Semester 5**	**21**
Basic Electrical Concepts & Circuits	3	Probability, Statistic & Random Process	3
Basic Programming (C++)	4	Operating Systems	4
Calculus 1	4	Computer Networks	4
Philosophy	6	Web Application Development	4
Intensive English 2	12	Software Engineering	3
		Physical Training 1	3
Semester 2	**27**	**Semester 6**	**18**
Circuit Analysis	3	Intro to Aritificial Intelligence	4
Algorithms & Data Structures	4	Principles of Programming Languagues	4
Calculus 2	4	Elective	3
Engineering Math for IT	4	Physical Training 2	3
Political Economy	5	Academic English 2	4
Academic English 1	4		
Physics	3		
Summer Semester 1		**Summer Semester 3**	**3**
		Internship	3
Semester 3	**22**	**Semester 7**	**8**
Introduction to Computing	3	Special Study of the Field	2
Chemistry for Engineers	4	Principle of Economics	3
Physics 1	2	Elective	3
Physics 2	2		
Critical Thinking (3)	3		
Digital Logic Design	4		
Object-Oriented Programming	4		
Semester 4	**21**	**Semester 8**	**10**
Physics 4	2	Thesis	10
Discrete Mathematics	3		
Computer Architecture	4		
Object-Oriented Analysis and Design	4		
Principles of Database Management	4		
Theoretical Models in Computing	4		

Total of Academic Credits **136**
Credits of Humanities **10**

SCSE - Computer Engineering 07 - (Toefl < 430)

Subject	Credits	Subject	Credits
Semester 1	**32**	**Semester 5**	**19**
Intensive English 1	32	Probability, Statistic & Random Process	3
		Operating Systems	4
		Calculus 3	4
		System and Signals	4
		Differential Equations	4
Semester 2	**32**	**Semester 6**	**22**
Basic Electrical Concepts & Circuits	3	Digital System Design	4
Basic Programming (C++)	4	Digital Electronics	4
Calculus 1	4	Electronic Devices	4
Philosophy	6	Software Engineering	3
Physics	3	Physical Training 1	3
Intensive English 2	12	Academic English 2	4
Summer Semester 1	**8**	**Summer Semester 3**	**3**
Algorithms & Data Structures	4	Internship	3
Calculus 2	4		
Semester 3	**22**	**Semester 7**	**17**
Introduction to Computing	3	Special Study of the Field	2
Chemistry for Engineers	4	Principle of Economics	3
Physics 1	2	Elective	3
Physics 2	2	Elective	3
Critical Thinking (3)	3	Elective	3
Digital Logic Design	4	Physical Training 2	3
Object-Oriented Programming	4		
Semester 4	**21**	**Semester 8**	**10**
Physics 4	2	Thesis	10
Academic English 1	4		
Discrete Mathematics	3		
Computer Architecture	4		
Programming and Problem Solving (Matlab)	4		
Principle of EE 2	4		

Total of Academic Credits **136**
Credits of Humanities **10**

SCSE - Computer Engineering 07 - Information Technology Major - (Toefl < 430)

Subject	Credits	Subject	Credits
Semester 1	**32**	**Semester 5**	**22**
Intensive English 1	32	Probability, Statistic & Random Process	3
		Operating Systems	4
		Calculus 3	4
		Computer Networks	4
		Software Engineering	3
		Object-Oriented Analysis and Design	4
Semester 2	**32**	**Semester 6**	**19**
Basic Electrical Concepts & Circuits	3	Information System Management	4
Basic Programming (C++)	4	Net-Centric Programming	4
Calculus 1	4	Web Application Development	4
Philosophy	6	Physical Training 1	3
Physics	3	Academic English 2	4
Intensive English 2	12		
Summer Semester 1	**8**	**Summer Semester 3**	**3**
Algorithms & Data Structures	4	Internship	3
Calculus 2	4		
Semester 3	**22**	**Semester 7**	**14**
Introduction to Computing	3	Special Study of the Field	2
Chemistry for Engineers	4	Principle of Economics	3
Physics 1	2	Elective	3
Physics 2	2	Elective	3
Critical Thinking	3	Physical Training 2	3
Digital Logic Design	4		
Object-Oriented Programming	4		
Semester 4	**21**	**Semester 8**	**10**
Physics 4	2	Thesis	10
Academic English 1	4		
Discrete Mathematics	3		
Computer Architecture	4		
Principles of Database Management	4		
Theoretical Models in Computing	4		

Total of Academic Credits **133**
Credits of Humanities **10**

SCSE - Computer Science 07 (Toefl < 430)

Subject	Credits	Subject	Credits
Semester 1	**32**	**Semester 5**	**22**
Intensive English 1	32	Probability, Statistic & Random Process	3
		Operating Systems	4
		Calculus 3	4
		Computer Networks	4
		Software Engineering	3
		Object-Oriented Analysis and Design	4
Semester 2	**32**	**Semester 6**	**19**
Basic Electrical Concepts & Circuits	3	Intro to Aritificial Intelligence	4
Basic Programming (C++)	4	Principles of Programming Languagues	4
Calculus 1	4	Web Application Development	4
Philosophy	6	Physical Training 1	3
Physics	3	Academic English 2	4
Intensive English 2	12		
Summer Semester 1	**8**	**Summer Semester 3**	**3**
Algorithms & Data Structures	4	Internship	3
Calculus 2	4		
Semester 3	**22**	**Semester 7**	**14**
Introduction to Computing	3	Special Study of the Field	2
Chemistry for Engineers	4	Principle of Economics	3
Physics 1	2	Elective	3
Physics 2	2	Elective	3
Critical Thinking	3	Physical Training 2	3
Digital Logic Design	4		
Object-Oriented Programming	4		
Semester 4	**21**	**Semester 8**	**10**
Physics 4	2	Thesis	10
Academic English 1	4		
Discrete Mathematics	3		
Computer Architecture	4		
Principles of Database Management	4		
Theoretical Models in Computing	4		

Total of Academic Credits **133**
Credits of Humanities **10**

SCSE - Computer Engineering 08 - (Toefl >= 500)

Subject	Credits	Subject	Credits
Semester 1	**19**	**Semester 5**	**20**
Calculus 1	4	Probability, Statistic & Random Process	3
Introduction to Computing	3	Discrete Mathematics	3
Academic English 1	4	Electronic Devices	4
Chemistry for Engineers	4	System and Signals	4
Physics 1	2	Software Engineering	3
Physics 2	2	Physical Training 1	3
Semester 2	**19**	**Semester 6**	**15**
Calculus 2	4	Digital System Design	4
Physics 3	4	Digital Electronics	4
Academic English 2	4	Operating Systems	4
C/C++ Programming	4	Physical Training 2	3
Critical Thinking	3		
Summer Semester 1		**Summer Semester 3**	**3**
		Internship	3
Semester 3	**18**	**Semester 7**	**11**
Calculus 3	4	Special Study of the Field	2
Physics 4	2	Principle of Economics	3
Digital Logic Design	4	Elective	3
Object-Oriented Programming	4	Elective	3
Principles of EE 1	4		
Semester 4	**20**	**Semester 8**	**10**
Differential Equations	4	Thesis	10
Computer Architecture	4		
Programming and Problem Solving (Matlab)	4		
Principle of EE 2	4		
Data Structures and Algorithms	4		

Total of Academic Credits **135**
Credits of Humanities **10**

SCSE - Computer Engineering 08 -
Information Technology Major - (Toefl >= 500)

Subject	Credits	Subject	Credits
Semester 1	**19**	**Semester 5**	**21**
Calculus 1	4	Probability, Statistic & Random Process	3
Introduction to Computing	3	Operating Systems	4
Academic English 1	4	Computer Networks	4
Chemistry for Engineers	4	Web Application Development	4
Physics 1	2	Software Engineering	3
Physics 2	2	Physical Training 1	3
Semester 2	**19**	**Semester 6**	**14**
Calculus 2	4	Information System Management	4
Physics 3	4	Net-Centric Programming	4
Academic English 2	4	Elective	3
C/C++ Programming	4	Physical Training 2	3
Critical Thinking	3		3
Summer Semester 1		**Summer Semester 3**	**3**
		Internship	3
Semester 3	**18**	**Semester 7**	**11**
Calculus 3	4	Special Study of the Field	2
Physics 4	2	Principle of Economics	3
Digital Logic Design	4	Elective	3
Object-Oriented Programming	4	Elective	3
Theoretical Models in Computing	4		
Semester 4	**19**	**Semester 8**	**10**
Discrete Mathematics	3	Thesis	10
Computer Architecture	4		
Object-Oriented Analysis and Design	4		
Principles of Database Management	4		
Data Structures and Algorithms	4		

Total of Academic Credits **134**
Credits of Humanities **10**

SCSE - Computer Science (Toefl >= 500)

Subject	Credits	Subject	Credits
Semester 1	**19**	**Semester 5**	**21**
Calculus 1	4	Probability, Statistic & Random Process	3
Introduction to Computing	3	Operating Systems	4
Academic English 1	4	Computer Networks	4
Chemistry for Engineers	4	Web Application Development	4
Physics 1	2	Software Engineering	3
Physics 2	2	Physical Training 1	3
Semester 2	**19**	**Semester 6**	**14**
Calculus 2	4	Intro to Aritificial Intelligence	4
Physics 3	4	Principles of Programming Languagues	4
Academic English 2	4	Elective	3
C/C++ Programming	4	Physical Training 2	3
Critical Thinking	3		
Summer Semester 1		**Summer Semester 3**	**3**
		Internship	3
Semester 3	**18**	**Semester 7**	**11**
Calculus 3	4	Special Study of the Field	2
Physics 4	2	Principle of Economics	3
Digital Logic Design	4	Elective	3
Object-Oriented Programming	4	Elective	3
Theoretical Models in Computing	4		
Semester 4	**19**	**Semester 8**	**10**
Discrete Mathematics	3	Thesis	10
Computer Architecture	4		
Object-Oriented Analysis and Design	4		
Principles of Database Management	4		
Data Structures and Algorithms	4		

Total of Academic Credits **134**
Credits of Humanities **10**

SCSE - Computer Engineering 08 - (500> Toefl >= 430)

Subject	Credits	Subject	Credits
Semester 1	**19**	**Semester 5**	**20**
Intensive English 2	12	Probability, Statistic & Random Process	3
Introduction to Computing	3	Discrete Mathematics	3
Physics 1	2	Electronic Devices	4
Physics 2	2	System and Signals	4
		Software Engineering	3
		Physical Training 1	3
Semester 2	**23**	**Semester 6**	**15**
Calculus 1	4	Digital System Design	4
Physics 3	4	Digital Electronics	4
Chemistry for Engineers	4	Operating Systems	4
Academic English 1	4	Physical Training 2	3
C/C++ Programming in Unix	4		
Critical Thinking	3		
Summer Semester 1	**8**	**Summer Semester 3**	**3**
Calculus 2	4	Internship	3
Academic English 2	4		
Semester 3	**18**	**Semester 7**	**11**
Calculus 3	4	Special Study of the Field	2
Physics 4	2	Principle of Economics	3
Digital Logic Design	4	Elective	3
Object-Oriented Programming	4	Elective	3
Principles of EE 1	4		
Semester 4	**20**	**Semester 8**	**10**
Differential Equations	4	Thesis	10
Computer Architecture	4		
Programming and Problem Solving (Matlab)	4		
Principle of EE 2	4		
Data Structures and Algorithms	4		

Total of Academic Credits **135**
Credits of Humanities **10**

SCSE - Computer Engineering 08 -
Information Technology Major - (500> Toefl >= 430)

Subject	Credits	Subject	Credits
Semester 1	**19**	**Semester 5**	**21**
Intensive English 2	12	Probability, Statistic & Random Process	3
Introduction to Computing	3	Operating Systems	4
Physics 1	2	Computer Networks	4
Physics 2	2	Web Application Development	4
		Software Engineering	3
		Physical Training 2	3
Semester 2	**23**	**Semester 6**	**14**
Calculus 1	4	Information System Management	4
Physics 3	4	Net-Centric Programming	4
Chemistry for Engineers	4	Elective	3
Academic English 1	4	Physical Training 2	3
C/C++ Programming in Unix	4		
Critical Thinking	3		
Summer Semester 1	**8**	**Summer Semester 3**	**3**
Calculus 2	4	Internship	3
Academic English 2	4		
Semester 3	**18**	**Semester 7**	**11**
Calculus 3	4	Special Study of the Field	2
Physics 4	2	Principle of Economics	3
Digital Logic Design	4	Elective	3
Object-Oriented Programming	4	Elective	3
Theoretical Models in Computing	4		
Semester 4	**19**	**Semester 8**	**10**
Discrete Mathematics	3	Thesis	10
Computer Architecture	4		
Object-Oriented Analysis and Design	4		
Principles of Database Management	4		
Data Structures and Algorithms	4		

Total of Academic Credits **134**
Credits of Humanities **10**

SCSE - Computer Science 08 (500> Toefl >= 430)

Subject	Credits	Subject	Credits
Semester 1	**19**	**Semester 5**	**21**
Intensive English 2	12	Probability, Statistic & Random Process	3
Introduction to Computing	3	Operating Systems	4
Physics 1	2	Computer Networks	4
Physics 2	2	Web Application Development	4
		Software Engineering	3
		Physical Training 1	3
Semester 2	**23**	**Semester 6**	**14**
Calculus 1	4	Intro to Aritificial Intelligence	4
Physics 3	4	Principles of Programming Languagues	4
Chemistry for Engineers	4	Elective	3
Academic English 1	4	Physical Training 2	3
C/C++ Programming in Unix	4		
Critical Thinking	3		
Summer Semester 1	**8**	**Summer Semester 3**	**3**
Calculus 2	4	Internship	3
Academic English 2	4		
Semester 3	**18**	**Semester 7**	**11**
Calculus 3	4	Special Study of the Field	2
Physics 4	2	Principle of Economics	3
Digital Logic Design	4	Elective	3
Object-Oriented Programming	4	Elective	3
Theoretical Models in Computing	4		
Semester 4	**19**	**Semester 8**	**10**
Discrete Mathematics	3	Thesis	10
Computer Architecture	4		
Object-Oriented Analysis and Design	4		
Principles of Database Management	4		
Data Structures and Algorithms	4		

Total of Academic Credits **134**
Credits of Humanities **10**

SCSE - Computer Engineering 08 - (Toefl < 430)

Subject	Credits	Subject	Credits
Semester 1	**32**	**Semester 5**	**20**
Intensive English 1	32	Probability, Statistic & Random Process	3
		Discrete Mathematics	3
		Physics 4	2
		Academic English 1	4
		System and Signals	4
		Data Structures and Algorithms	4
Semester 2	**23**	**Semester 6**	**19**
Intensive English 2	12	Digital System Design	4
Introduction to Computing	3	Electronic Devices	4
Physics 1	2	Software Engineering	3
Physics 2	2	Academic English 2	4
Calculus 1	4	Chemistry for Engineers	4
Summer Semester 1	**8**	**Summer Semester 3**	**3**
Calculus 2	4	Internship	3
C/C++ Programming in Unix	4		
Semester 3	**19**	**Semester 7**	**19**
Calculus 3	4	Special Study of the Field	2
Physics 3	4	Principle of Economics	3
Digital Logic Design	4	Elective	3
Critical Thinking	3	Digital Electronics	4
Principles of EE 1	4	Physical Training 1	3
		Operating Systems	4
Semester 4	**20**	**Semester 8**	**16**
Differential Equations	4	Thesis	10
Computer Architecture	4	Elective	3
Programming and Problem Solving (Matlab)	4	Physical Training 2	3
Principle of EE 2	4		
Object-Oriented Programming	4		

Total of Academic Credits **135**
Credits of Humanities **10**

SCSE - Computer Engineering 08 -
Information Technology major (Toefl < 430)

Subject	Credits	Subject	Credits
Semester 1	**32**	**Semester 5**	**21**
Intensive English 1	32	Probability, Statistic & Random Process	3
		Operating Systems	4
		Physics 4	2
		Academic English 1	4
		Computer Networks	4
		Theoretical Models in Computing	4
Semester 2	**23**	**Semester 6**	**19**
Intensive English 2	12	Information System Management	4
Introduction to Computing	3	Software Engineering	3
Physics 1	2	Net-Centric Programming	4
Physics 2	2	Web Application Development	4
Calculus 1	4	Academic English 2	4
Summer Semester 1	**8**	**Summer Semester 3**	**3**
Calculus 2	4	Internship	3
C/C++ Programming in Unix	4		
Semester 3	**19**	**Semester 7**	**18**
Calculus 3	4	Special Study of the Field	2
Physics 3	4	Principle of Economics	3
Digital Logic Design	4	Elective	3
Critical Thinking	3	Elective	3
Object-Oriented Programming	4	Chemistry for Engineers	4
		Physical Training 1	3
Semester 4	**19**	**Semester 8**	**16**
Discrete Mathematics	3	Thesis	10
Computer Architecture	4	Elective	3
Object-Oriented Analysis and Design	4	Physical Training 2	3
Principles of Database Management	4		
Data Structures and Algorithms	4		

Total of Academic Credits **134**
Credits of Humanities **10**

SCSE - Computer Science 08 (Toefl < 430)

Subject	Credits	Subject	Credits
Semester 1	**32**	**Semester 5**	**21**
Intensive English 1	32	Probability, Statistic & Random Process	3
		Operating Systems	4
		Physics 4	2
		Academic English 1	4
		Computer Networks	4
		Theoretical Models in Computing	4
Semester 2	**23**	**Semester 6**	**19**
Intensive English 2	12	Intro to Aritificial Intelligence	4
Introduction to Computing	3	Principles of Programming Languagues	4
Physics 1	2	Software Engineering	3
Physics 2	2	Web Application Development	4
Calculus 1	4	Academic English 2	4
Summer Semester 1	**8**	**Summer Semester 3**	**3**
Calculus 2	4	Internship	3
C/C++ Programming in Unix	4		
Semester 3	**19**	**Semester 7**	**18**
Calculus 3	4	Special Study of the Field	2
Physics 3	4	Principle of Economics	3
Digital Logic Design	4	Elective	3
Critical Thinking	3	Elective	3
Object-Oriented Programming	4	Chemistry for Engineers	4
		Physical Training 1	3
Semester 4	**19**	**Semester 8**	**16**
Discrete Mathematics	3	Thesis	10
Computer Architecture	4	Elective	3
Object-Oriented Analysis and Design	4	Physical Training 2	3
Principles of Database Management	4		
Data Structures and Algorithms	4		

Total of Academic Credits **134**
Credits of Humanities **10**

VII. Twinning Program with Nottingham University (UN)

Subject	Credits	
Semester 1	**17**	**IU Equivalence**
Foundation Maths I	4	Calculus 1
IT & Design	3	
Light, Wave & Electron	3	Physics (old program)
Properties of Materials	3	
Academic English 1	4	
Semester 2	**20**	
Foundation Maths II	4	Calculus 2
Electronic Information – The WWW	3	
Digital Media	3	
Electricity & Magnetism	3	
Mathematics for Computer Scientist	3	Discrete Mathematics
Academic English 2	4	
Semester 3	**18**	
Programming 1	3	
Algorithmic Problem Solving	3	
Introduction to Artificial Intelligence	3	
Skills for Commucation	3	
Computer System Architecture	3	
Optional course	3	Numerical Methods
Semester 4	**23**	
Programming 2	3	
Database Systems	3	
Unix and Software Tools	3	
Functional Programming	3	
Introduction to Software Engineering	3	
Optional course	3	Computer Graphics

VIII. Twinning Program with University of West of England (WE)

Using the same schedule with Computer Engineering 2008

IX. Twinning Program with New South Wales (NSW)

Using the same schedule with Computer Engineering 2008

X. Twinning Program with Rutgers, the State University of New Jersey (RU)

Using the same schedule with Computer Engineering 2008

PART 3

XI. COURSE DESCRIPTION:

1. Calculus 1 (MA101)

Functions; Limits; Continuity; Derivatives, Differentiation, Derivatives of Basic Elementary Functions, Differentiation Rules; Applications of Differentiation: l'Hôpital's Rule, Optimization, Newton's Method; Anti-derivatives; Integrals, Definite Integral, Fundamental Theorem of Calculus; Techniques of Integration.

2. Calculus 2 (MA102)

Integration by parts, trigonometric substitution, partial fractions technique, imroer integrals, areas, volumes, arc length, average of functions, applications to physics and engineering, modeling with differential equations, separable equations, logistic equation, predator-prey systems, Sequence and Series; Convergence Tests; Power Series; Taylor and Maclaurin Series; applications of Taylor polynomials, using series to solve differential equations.

3. Calculus 3 (MA203)

Cartesian Coordinates; Lines, Planes and Surfaces; Dot and Cross Products; Functions of Several Variables; Limits, Continuity, Partial Derivatives, Tangent Planes; Gradient Vectors; Extrema; Lagrange Multipliers; Multiple Integrals: Double Integrals, Triple Integrals, Techniques of Integration; Vector Fields, Line Integrals, Surface Integrals.

4. Discrete Mathematics (MA204)

Logic, Logical equivalences, Predicates and Quantifiers, Methods of proof, Sets, Functions, Mathematical Induction, basical rules of counting, Pigeonhole principle, Permutations and Combinations, Binomieal coefficeints, Generalized Permutations and Combinations, Integers and division, Linear Congruences, Relatinos and Their Properties, n-ary relations and aplications, Representing relations, Closures of relations, Equivalence relations, Partial orderings, Introduction to graphs, Graph terminology, Representating graphs and graph isomorphism, Connectivity, Euler and Hamilton paths, Shortest-Path problems, Planar graphs, graph coloring, Introduction to trees, applications of trees, Tree traversal, Spanning trees, Minimum spanning trees, Boolean functions, Representing Boolean functions, Logic gates, Minimization of circuits.

5. Physics 1 (PH101)

Engineering Mechanics: force, moment, equilibrium, truss, frame and machine, center of mass, centroid of composites, theorem of Pappus, beam, friction, virtual work, potential energy and stability.

6. Physics 2 (PH102)

Torque, angular momentum, static equilibrium, oscillatory, gravity, fluid dynamics, wave, sound wave, temperature, heat, First Law of Thermodynamics, Kinetic Theory of Gases, Second Law of Thermodynamics.

7. Physics 3 (PH103)

To provide a thorough introduction to the basic principles of physics to physics and engineering students in order to prepare them for further study in physics and to support their understanding and design of practical applications in their fields. Content:

Electrostatics, particles in electric and magnetic fields, electromagnetism, circuits, Maxwell's equations, electromagnetic radiation.

8. Physics 4 (PH204)

Waves and optics, relativity, quantum properties of electrons and photons, wave mechanics, atomic, solid state, nuclear and elementary particle physics.

9. Chemistry for Engineers (CH101)

Introduction to chemical principles and their application. Includes stoichiometry, states of matter, atomic and molecular structure, solutions, thermodynamics, equilibrium, oxidation-reduction, kinetics, nonmetals, metals and coordination compounds, and nuclear chemistry.

10. Probability, Statistics & Random Process – (MA205)

Probability: sample space and events, Venn Diagram and algebra of events, probability of event, additive rules, conditional probability, Bayes rules, random variables and their distributions, mathematical expectation, some discrete probability distributions, some continuous probability distributions, functions of random variables, independence.

Mathematical Statistics: Sampling distributions and data descriptions, estimation problems, hypothesis tests, linear regressions, analysis of variance, nonparametric statistics, simulation.

11. Introduction to Computing (IT101)

Basics of Computing: basic concepts, models, trends in industry. Introduction to majors and curricula, career path of all majors in computing, career orientation. Job requirements and career opportunities in industry

12. C/C++ Programming in Unix (IT102)

This course covers algorithm development and the principles of computer programming using C and C++ in a Unix environment. Topics include introduction to computers and computing, program development, C/C++ programming language syntax, and elementary numerical methods for scientists and engineers. Unix environment and utilities are also introduced.

13. Critical Thinking (GE101)

This course provides students the fundamental knowledge of critical thinking concept. This is a general thinking skill that is useful for all sorts of careers and professions.

14. Object-Oriented Programming (IT204)

Basics of programming and data structures in Java. Basic data types: loops, arrays, recursion, and pointers. Object oriented design: classes, inheritance, overloading, and polymorphism; Abstract Data Types: lists, linked lists, stacks, and queues; Introduction to algorithm analysis: O notation, searching and sorting.

15. Data Structures and Algorithms (IT205)

To investigate the essential properties of data structures and algorithms for operating on them; to use these structures as tools to assist algorithm design; to extend exposure to searching, sorting and hashing techniques.

16. Principles of EE 1 (IT206)

Circuit elements, Independent sources, Dependent sources, Circuit analysis in DC and AC steady state, Network theorems, Operational amplifiers, Power Computations.

17. Principles of EE 2 (IT207)

Passive and active filter circuit design, Butterworth filter design, transient analysis by classical methods and by Laplace Transform analysis, step and impulse response, two-port networks, Introduction to Fourier Series, three phase circuits.

18. Digital Logic Design (IT208)

Binary arithmetic, Boolean algebra, K-maps, Combinational circuit synthesis, Combinational MSI circuits, Sequential logic, Synchronous state machine design, Sequential MSI circuits.

19. Programming and Problem Solving (Matlab) (IT209)

Introduction to Matlab programming. Numeric, Cell, and Structure Arrays; Functions and Files; Plotting and Model Building; Statistics, Histograms, and Probability.

20. Systems and Signals (IT310)

Introduction to continuous- and discrete-time systems and signals, basis function representation of signals, convolution, Fourier Series, Fourier, Laplace, Z-transform theory, state space variable analysis of linear systems, basic feedback concepts.

21. Electronic Devices (IT311)

Fundamentals of semiconductor devices and microelectronic circuits, characteristics of p-n, Zener diodes, and analog diode circuits. Principles of MOSFET and BJT operation, biasing, transistor analysis at midband frequencies.

22. Computer Architecture (IT312)

History and principles of computer architecture. Computer Organization, Assembly language and machine code, computer arithmetic, ALU design, computer performance, data path and control, pipelining, memory hierarchy, I/O devices, multi-processor architectures, and mobile and multi-core processors.

23. Operating Systems (IT313)

To study fundamentals of operating systems and system programming using the functions and facilities of a modern operating system.

24. Software Engineering (IT314)

Software development lifecycle, object-oriented software engineering, system specification, software measurement and estimation, software design patterns.

25. Internship (IT315)

To make students get used with the working environment in industry, give them a period to practice their skills and understand the requirements of companies.

26. Digital Electronics (IT416)

Principles of digital electronics, implementation of logic gates with MOSFETs and BJTs. Understanding and analysis of different logic families including NMOS CMOS, TTL and ECL. Fundamentals of digital memory circuits.

27. Digital System Design (IT417)

Hardware description using the Verilog language. Design methodologies for combinational and sequential logic circuits. Characteristics of microprocessors, fault-tolerant computer design, computer arithmetic, and advanced state machine theory. Digital machine organization for testing and fault-tolerance.

28. Special Study on the Field (IT418) & Graduating Thesis (IT419)

Theses are industry type projects, designed to ensure students have master their studies in the program. All projects are based on “Real projects” provided by industry for students to work on developing skill and applying knowledge gained from all courses throughout the program. Students will work in teams to develop requirements, design, implementation, and provide a solution to the business problems. Students may follow any suitable process model, must manage the project themselves, following all appropriate project management techniques. Success of the project is determined in large part, by whether students have adequately solved their customer’s problem.

Students will be expected to deliver the final products along with all artifacts appropriate to the process model they are using (i.e.: project plan, requirements specification; system and software architect documents, design documents, test plans, source code, and installable software products).

29. Concepts in VLSI Design (IT451)

To introduce concepts of digital VLSI chip design. Introductory digital VLSI chip design. CMOS technology, dynamic clocked logic, layout design rules, and analog MOSFET timing analysis.

30. Digital Signal Processing (IT452)

Introduction to digital signal processing, sampling and quantization, A/D and D/A converters, discrete time systems, convolution, z-transforms, transfer functions, digital filter realizations, fast Fourier transforms, filter design, and digital audio applications.

31. Digital Signal Processing Design (IT453)

Applications of DSP algorithms in the areas of speech

processing, image processing, radar, pattern recognition, and adaptive filtering using software implementations applied to realistic signals.

32. Embedded Systems (IT454)

Increasing integration of communications, multimedia and processing and relentless digitization of data (including even RF data) continues to expand the scope and complexity of embedded systems. To appreciate these advances, and to productively contribute to future advances of these systems, a critical appreciation of the underlying technology underpinning is a must.

33. Micro-Processing Systems (IT455)

Overview of microelectronic processing technology, lithography, etching, oxidation, diffusion, implantation and annealing, film deposition, epitaxy growth, metallization, process integration and simulation.

34. Theoretical Models in Computing (IT220)

The course provides undergraduate students with mathematical reasoning, combinatorial analysis, algorithmic thinking and modeling, and automata theory as the study of abstract computing devices.

35. Principles of Database Management (IT221)

Overview of Database management, architecture; Hierarchical, network, relational models; Entity-relationship data model, relational database design; Data dependencies and Normalization, security and integrity constraints; Transaction management for multi-user database systems; SQL Server and other commercial RDBMs.

36. Object-Oriented Analysis and Design (IT222)

System modeling. System analysis and design paradigms. Product Life Cycle. Unified Process and its workflows: requirement, analysis, design, implementation, testing. Advanced topics: object-oriented databases, design patterns, Extreme Programming.

37. Project Management (IT471)

Fundamental software project management knowledge: plan-driven and agile methodologies, estimating techniques: wide-band, Delphi, parametric estimating; work-breakdown-structure, costs and budgeting, change management; risk management; earned value management, quality, monitoring and control; measurements and metrics, relationship and people issues, project close-out.

38. Computer Networks (IT324)

Network protocol design principles, reliable transport protocols, routing, quality of service, multimedia networking, Internet telephony, wireless networks.

39. Information System Management (IT425)

Focus on how information systems are used by businesses and how they impact business activities. While the technology of information systems (i.e., information technology) is presented and discussed, the key issue is how these technologies are used to solve business problems and exploit opportunities.

40. Network-Centric Programming (IT426)

Advanced programming with a focus on developing software for networked systems using Linux as a reference platform. Topics: Programming Tools, Software Design, Programming Techniques, Environment of a UNIX Process, Memory Allocation, Garbage Collection, Process Control, Process Relationships, Signals, Reliable Signals, Threads, I/O Multiplexing, Datagram and Stream Sockets, Multicasting, Device Driver and Kernel Programming, Secure Programming.

41. Web Application Development (IT323)

Web programming concepts and models. HTML, Java Server Page, Java Bean, MVC model, Java utilities and development environments, extended Java frameworks as Ajax and Struts.

42. Principles of Programming Languages (IT428)

The course is aimed at making the student familiar with the general concepts common to all programming languages so as to facilitate learning new languages.

Language paradigms (i.e., logic, functional, procedural, object-oriented) are compared and implementation strategies are discussed.

43. Introduction to Artificial Intelligence (IT427)

This course provides a technical introduction of fundamental concepts of artificial intelligence (AI). Topics include: history of AI, agents, search (search space, uninformed and informed search, constraint satisfaction, game playing), knowledge representation (logical encodings of domain knowledge, logical reasoning systems), planning, and the language Lisp. The course is suitable for students who want to gain a solid technical background and as a preparation for more advanced work in AI.

44. Computer Graphics (IT472)

Computer display systems, algorithms and languages for interactive computer graphics. 3D coordinate frame transformations. Vector, curve and surface generation. Lighting, Illumination and Shading. Camera models and image based rendering.

45. User Interface Design and Evaluation (IT473)

This class covers the theory, design, evaluation, and development process for interactive application interfaces. The course is built around a large design and evaluation project that is completed in groups. Topics include: human capabilities and limitations, the interface design and engineering process, prototyping, issues in interface construction, interface evaluation, and current topics such as information appliances and world wide web interface issues.

46. Software Architecture (IT474)

Provide a broad understanding of the software and systems architecture. The role of the architect and what role the architecture plays in relationship with the other phases of development and the organization itself.

XII. COURSE SYLLABUS

International University, School of Computer Science and Engineering
ABET COURSE SYLLABUS
COURSE: IT101

Course Catalog Description: IT101 – Introduction to Computing (3)
Basics of Computing: basic concepts, models, trends in industry. Introduction to majors and curricula, career path of all majors in computing, career orientation. Job requirements and career opportunities in industry

Pre-Requisite Courses: None

Textbook & Materials:

Gerard O'Regan, *A Brief History of Computing*, Springer-Verlag London Limited, 2008.

Paul E. Ceruzzi, *A History of Modern Computing*, Second edition, The MIT Press, Cambridge, Massachusetts, London, England, 2003.

Nell Dale and John Lewis, *Computer science illuminated*, Jones and Bartlett Publishers, Inc., 2002.

Jan Goldberg, *Great Jobs for Computer Science Majors*, McGraw-Hill, 2003.

References:

Overall Educational Objective: To gain fundamental knowledge and history of computing, to know how to orient and plan future professional career, learning methodologies in university, to seek and manage information, and to train basic documenting skills.

Course Learning Outcomes: A student who successfully fulfills the course requirements will have demonstrated:

1. an in-depth understanding of fundamental knowledge and history of computing.
2. an ability to explain basic computing terminologies.
3. an in-depth understanding of all career paths in computing.
4. an ability to orient and make a plan for his/her own future career.
5. an in-depth understanding of learning methodologies in university.
6. an ability to seek information from Internet and manage his/her information.
7. an ability to document his/her works.

How Course Outcomes are Assessed:

HW and quizzes (30 %)
Mid-Term Exam (20 %)
Final Exam (50%)

N = none S = Supportive H = highly related

Outcome	Level	Proficiency assessed by
(a) an ability to apply knowledge of Mathematics, science, and engineering	N	
(b) an ability to design and conduct experiments and interpret data	N	
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as	N	

economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability		
(d) an ability to function as part of a multi-disciplinary team	S	HW Problems
(e) an ability to identify, formulate, and solve CSE problems	N	
(f) an understanding of professional and ethical responsibility	H	Exams
(g) an ability to communicate in written and oral form	S	HW Problems and Exams
(h) the broad education necessary to understand the impact of computer science and engineering solutions in a global, economic, environmental, and societal context	H	HW Problems, discussions during lectures, Exams
(i) a recognition of the need for, and an ability to engage in life-long learning	H	HW Problems, discussions during lectures
(j) a knowledge of contemporary issues	H	HW Problems, discussions during lectures
(k) an ability to use the techniques, skills, and modern engineering tools necessary for computer science and engineering practice	H	HW Problems, Exams
Basic disciplines in Computer Science	S	HW Problems
Depth in Computer Science	N	
Basic disciplines in Information Technology	S	HW Problems
Depth in Information Technology	N	
Basic disciplines in Computer Engineering	S	HW Problems
Depth in Computer Engineering	N	
Laboratory equipment and software tools	N	
Variety of instruction formats	S	Lecture

Topics Covered week by week:

Week 1: Brief history of computing and overall architecture of computer systems
Week 2: Information Layer
Week 3: Hardware Layer
Week 4: Programming Layer
Week 5: Operating Systems Layer
Week 6: Applications Layer
Week 7: Communication and Network Layer
Week 8: Midterm
Week 9: Majors and Curricula, Career Paths and Orientation
Week 10: Career Requirements and Opportunities at a Hardware Company (represented by Intel or Renesas)
Week 11: Career Requirements and Opportunities at a Network Company (represented by IBM or Anthena)
Week 12: Career Requirements and Opportunities at a Software Company (represented by FCG, GCS or TMA)
Week 13: Learning Methodologies in the University Level + IT Documenting Skills
Week 14: IT Documenting Skills (cont.)
Week 15: Information Seeking and Management (cont.) + Final Review

Computer Usage: Students use their own computer with Internet connection to complete HWs
Laboratory Experiences: None
Design Experiences: None
Independent Learning Experiences: Seeking and collecting information form Internet to write reports
Contribution to the Professional Component:

(a) College-level mathematics and basic sciences:
(b) Engineering Topics (Science and/or Design):
(c) General Education: 3 credit hours

Total credits: 3

Prepared by: Nguyen Duc Cuong
Date: May 2008

International University, School of Computer Science and Engineering
ABET COURSE SYLLABUS
COURSE: IT102

Course Catalog Description: IT102 – C/C++ Programming in Unix (4)
This course covers algorithm development and the principles of computer programming using C and C++ in an Unix environment. Topics include introduction to computers and computing, program development, C/C++ programming language syntax, and elementary numerical methods for scientists and engineers. Unix environment and utilities are also introduced.

Pre-Requisite Courses: None

Textbook & Materials: Walter Savitch, Absolute C++, 3rd ed., Addison Wesley, 2008.

References:

Overall Educational Objective: To develop skills in understanding general concepts of structural computer programming and problem solving, as well as programming simple programs that solve basic problems.

Course Learning Outcomes: A student who successfully fulfills the course requirements will have demonstrated:

1. an in-depth understanding of problem solving and computer programming
2. an in-depth understanding of common and useful algorithms
3. an ability to understand a given problem, decompose it to sub-problems that can be solved by learned algorithms
4. an ability to code C/C++ programs that solve simple practical problems

How Course Outcomes are Assessed:

HW and quizzes (25 %)
Mid-Term Exam (25 %)
Final Exam (50%)

N = none S = Supportive H = highly related

Outcome	Level	Proficiency assessed by
(a) an ability to apply knowledge of Mathematics, science, and engineering	H	HW Problems, Exams
(b) an ability to design and conduct experiments and interpret data	S	Design Problems in HW and Exams
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	N	
(d) an ability to function as part of a multi-disciplinary team	N	
(e) an ability to identify, formulate, and solve CSE problems	H	HW Problems, Exams
(f) an understanding of professional and ethical responsibility	N	
(g) an ability to communicate in written and oral form	S	HW Problems and Exams
(h) the broad education necessary to understand the impact of electrical and computer engineering solutions in a global, economic, environmental, and societal context	N	
(i) a recognition of the need for, and an ability to engage in life-long learning	S	Home-work, discussions during lectures
(j) a knowledge of contemporary issues	N	

(k) an ability to use the techniques, skills, and modern engineering tools necessary for computer science and engineering practice	H	HW Problems, Exams
Basic disciplines in Computer Science	H	HW Problems
Depth in Computer Science	S	HW Problems
Basic disciplines in Information Technology	H	HW Problems
Depth in Information Technology	S	HW Problems
Basic disciplines in Computer Engineering	H	HW Problems
Depth in Computer Engineering	S	HW Problems
Laboratory equipment and software tools	H	HW Problems
Variety of instruction formats	S	Lecture

Topics Covered week by week:

Week 1: introduction to Computers and C++ Programming
Week 2: Unix environment and utilities
Week 3: C++ Basics: Variables, Assignment, Data Types, I/O, Arithmetic Operations
Week 4: Flow of Controls
Week 5: Functions
Week 6: Streams and File I/O
Week 7: Array
Week 8: Review and Midterm
Week 9: Structures and Classes
Week 10: Class attributes and methods
Week 11: String
Week 12: Pointers and Linked-Lists
Week 13: Standard Template Library
Week 14: Inheritance and Polymorphism
Week 15: Final review

Computer Usage: Students use the computer as part of the co-requisite lab course
Laboratory Experiences: It is laboratory part associated with this course.
Design Experiences: HW problems and exams in problem solving.
Independent Learning Experiences:
Contribution to the Professional Component:

(a) College-level mathematics and basic sciences: 0.50 credit hours
(b) Engineering Topics (Science and/or Design): 3.50 credit hours
(c) General Education: 0 credit hours

Total credits: 4
Prepared by: Nguyen Duc Cuong
Date: May 2008

International University, School of Computer Science and Engineering
ABET COURSE SYLLABUS
COURSE: IT204

Course Catalog Description: IT204 – Object-Oriented Programming (4)
Problem solving through decomposition. Writing, debugging, and analyzing programs in Java. Algorithms for sorting and searching. Introduction to data structures, recursion.

Pre-Requisite Courses: None

Textbook & Materials: Harvey & Paul Deitel, *Java How to Program*, 7th edition, Prentice Hall, 2007, and class notes.

References:

Overall Educational Objective: To develop skills in understanding general concepts of object-oriented programming and problem solving, as well as programming simple programs that solve basic problems.

Course Learning Outcomes: A student who successfully fulfills the course requirements will have demonstrated:

1. an in-depth understanding of problem solving and computer programming
2. an in-depth understanding of common and useful algorithms
3. an ability to understand a given problem, decompose it to sub-problems that can be solved by learned algorithms
4. an ability to code Java programs that solve simple practical problems

How Course Outcomes are Assessed:

HW and quizzes (25 %)
Mid-Term Exam (25 %)
Final Exam (50%)

N = none S = Supportive H = highly related

Outcome	Level	Proficiency assessed by
(a) an ability to apply knowledge of Mathematics, science, and engineering	H	HW Problems, Exams
(b) an ability to design and conduct experiments and interpret data	S	Design Problems in HW and Exams
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	N	
(d) an ability to function as part of a multi-disciplinary team	N	
(e) an ability to identify, formulate, and solve CSE problems	H	HW Problems, Exams
(f) an understanding of professional and ethical responsibility	N	
(g) an ability to communicate in written and oral form	S	HW Problems and Exams
(h) the broad education necessary to understand the impact of electrical and computer engineering solutions in a global, economic, environmental, and societal context	N	
(i) a recognition of the need for, and an ability to engage in life-long learning	S	Home-work, discussions during lectures
(j) a knowledge of contemporary issues	N	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for computer science and engineering practice	H	HW Problems, Exams

Basic disciplines in Computer Science	H	HW Problems
Depth in Computer Science	S	HW Problems
Basic disciplines in Information Technology	H	HW Problems
Depth in Information Technology	S	HW Problems
Basic disciplines in Computer Engineering	H	HW Problems
Depth in Computer Engineering	S	HW Problems
Laboratory equipment and software tools	H	HW Problems
Variety of instruction formats	S	Lecture

Topics Covered week by week:

Week 1: Introduction – Programming Process
Week 2: Object-oriented programming in Java
Week 3: Data Hiding
Week 4: Inheritance
Week 5: Polymorphism
Week 6: Array
Week 7: Linked List
Week 8: Review and Midterm
Week 9: Stack
Week 10: Queue
Week 11: Sorting
Week 12: Sorting (cont.)
Week 13: Searching
Week 14: Searching (cont.)
Week 15: Final review

Computer Usage: Students use the computer as part of the co-requisite lab course
Laboratory Experiences: It is course IT04_Lab associated with this course.
Design Experiences: HW problems and exams in problem solving.
Independent Learning Experiences:
Contribution to the Professional Component:

(a) College-level mathematics and basic sciences: 0.25 credit hours
(b) Engineering Topics (Science and/or Design): 3.75 credit hours
(c) General Education: 0 credit hours

Total credits: 4
Prepared by: Nguyen Duc Cuong
Date: May 2008

International University, School of Computer Science and Engineering
ABET COURSE SYLLABUS
COURSE: IT205

Course Catalog Description: IT205 – Data Structures and Algorithms (4)
To investigate the essential properties of data structures and algorithms for operating on them; to use these structures as tools to assist algorithm design; to extend exposure to searching, sorting and hashing techniques.

Pre-Requisite Courses: IT204 – Object-Oriented Programming
MA205 – Discrete Mathematics (or co-requisite)

Pre-Requisite by Topic:
1. Programming fundamentals such as data structures, algorithms and subroutines.
2. Combinatorics

Textbook & Materials: Harvey & Paul Deitel, *Java How to Program*, 7th edition, Prentice Hall, 2007.
Robert Lafore, *Data Structures and Algorithms in Java*, 2nd edition, Sams, 2002.
Class notes.

References: Cormen, Leiserson, Rivest & Stein, *Introduction to Algorithms*, McGraw Hill, 2nd Edn, 2001.

Overall Educational Objective: To develop skills in understanding general concepts of analyzing computing algorithms, as well as using basic data structures to solve practical problems.

Course Learning Outcomes: A student who successfully fulfills the course requirements will have demonstrated:
1. an in-depth understanding of the complexity of a algorithm
2. an ability to analyze and evaluate the complexity of a algorithm
3. an in-depth understanding of common and useful data structures and algorithms
4. an ability to understand a given problem, decompose it to sub-problems that can be solved by learned algorithms
5. an ability to implement algorithms and problem solutions by Java

How Course Outcomes are Assessed:
HW and quizzes (25 %)
Mid-Term Exam (25 %)
Final Exam (50%)

N = none S = Supportive H = highly related

Outcome	Level	Proficiency assessed by
(a) an ability to apply knowledge of Mathematics, science, and engineering	H	HW Problems, Exams
(b) an ability to design and conduct experiments and interpret data	S	Design Problems in HW and Exams
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	N	
(d) an ability to function as part of a multi-disciplinary team	N	
(e) an ability to identify, formulate, and solve CSE problems	H	HW Problems, Exams
(f) an understanding of professional and ethical responsibility	N	
(g) an ability to communicate in written and oral form	S	HW Problems and

		Exams
(h) the broad education necessary to understand the impact of electrical and computer engineering solutions in a global, economic, environmental, and societal context	N	
(i) a recognition of the need for, and an ability to engage in life-long learning	S	Home-work, discussions during lectures
(j) a knowledge of contemporary issues	N	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for computer science and engineering practice	H	HW Problems, Exams
Basic disciplines in Computer Science	H	HW Problems
Depth in Computer Science	S	HW Problems
Basic disciplines in Information Technology	H	HW Problems
Depth in Information Technology	S	HW Problems
Basic disciplines in Computer Engineering	H	HW Problems
Depth in Computer Engineering	S	HW Problems
Laboratory equipment and software tools	H	HW Problems
Variety of instruction formats	S	Lecture

Topics Covered week by week:

Week 1: Introduction – Algorithm Correctness and Analysis
Week 2: Divide-and-Conquer Algorithms
Week 3: Recursive Algorithms
Week 4: Linked List
Week 5: Stacks and Queues
Week 6: Binary Tree
Week 7: Searching
Week 8: Review and Midterm
Week 9: Binary Search Tree
Week 10: Hashing
Week 11: Heap
Week 12: Graph
Week 13: Graph Algorithms
Week 14: Sorting
Week 15: Asymptotic Analysis - Final review

Computer Usage: Students use the computer as part of the co-requisite lab course
Laboratory Experiences: It is course IT05_Lab associated with this course.
Design Experiences: HW problems and exams in problem solving.
Independent Learning Experiences:
Contribution to the Professional Component:

(a) College-level mathematics and basic sciences: 0.25 credit hours
(b) Engineering Topics (Science and/or Design): 3.75 credit hours
(c) General Education: 0 credit hours

Total credits: 4
Prepared by: Nguyen Duc Cuong
Date: May 2008

International University, School of Computer Science and Engineering
ABET COURSE SYLLABUS
COURSE: IT206

Course Catalog Description: IT206 - Principles of Electrical Engineering 1 (3)
Circuit elements, Independent sources, Dependent sources, Circuit analysis in DC and AC steady state, Network theorems, Operational amplifiers, Power Computations.

Pre-Requisite Courses: MA101

Co-Requisite Courses: IT206Lab

Textbook & Materials: J. W. Nilsson and S. A. Riedel, *Electric Circuits,* 8th Ed., Prentice Hall, 2007, and class notes.

References: *MatLab: Student Version,* Current Edition, The Math Works, Inc..

Overall Educational Objective: To develop skills in determining DC and AC steady state solutions to electrical networks, and power computations.

Course Learning Outcomes: A student who successfully fulfills the course requirements will have demonstrated:

1. an ability to define and explain the meaning/function of charge, current, voltage, power, energy, R, L, C, the opamp, and the fundamental principles of Ohm's law, KVL and KCL including an understanding of electrical safety and the effect of current on humans.
2. an ability to write the equilibrium equations for a given network and solve them analytically, and also using appropriate software as needed for the steady state (DC and AC/phasor) solution.
3. an ability to state and apply the principles of superposition, linearity, source transformations, and Thevenin/Norton equivalent circuits to simplify the analysis of circuits and/or the computation of responses.
4. an ability to analyze resistive op amp circuits and design inverting, non-inverting, summing, and differential amplifier circuits using op amps.
5. an in depth understanding of the behavior of inductances and capacitances, and differentiating and integrating op amp circuits.
6. an ability to qualitatively and quantitatively predict and compute the steady state AC responses of basic circuits using the phasor method.
7. an ability to compute effective and average values of periodic signals and compute the instantaneous and average powers delivered to a circuit element.
8. an ability to compute the complex power associated with a circuit element and design a circuit to improve the power factor in an AC circuit.
9. an ability to determine the conditions for maximum power transfer to any circuit element.

How Course Outcomes are Assessed:

HW Problems (20 %)
Mid-Term Exams (30 %)
Final Exam (50 %)

N = none S = Supportive H = highly related

Outcome	**Level**	**Proficiency assessed by**
(a) an ability to apply knowledge of Mathematics, science, and engineering	H	HW Problems, Exams
(b) an ability to design and conduct experiments and interpret	N	
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	N	
(d) an ability to function as part of a multi-disciplinary team	N	
(e) an ability to identify, formulate, and solve ECE problems	H	HW Problems, Exams
(f) an understanding of professional and ethical responsibility	N	
(g) an ability to communicate in written and oral form	N	
(h) the broad education necessary to understand the impact of electrical and computer engineering solutions in a global, economic, environmental, and societal context	N	
(i) a recognition of the need for, and an ability to engage in life-long learning	S	Home-work
(j) a knowledge of contemporary issues	N	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for computer science and engineering practice	H	HW Problems, Exams
Basic disciplines in Computer Science	N	
Depth in Computer Science	N	
Basic disciplines in Information Technology	N	
Depth in Information Technology	N	
Basic disciplines in Computer Engineering	H	HW Problems, Exams
Depth in Computer Engineering	S	HW Problems, Exams
Laboratory equipment and software tools	S	HW Problems, Mid-Term
Variety of instruction formats	S	Lecture, office hour

Topics Covered week by week:

Week 1: Circuit variables: voltage, current, power and energy, Voltage and current sources, Dependent and independent sources, Circuit elements - resistance, inductance and capacitance.
Week 2: Modeling of practical circuits, Ohm's law and Kirchhoff s laws, Solution of simple circuits with both dependent and independent sources, Electrical safety
Week 3: Series-parallel resistance circuits and their equivalents, Voltage and current divider circuits, Delta-Wye equivalent circuits, D'Arsonval meter movement - ammeter, voltmeter and ohmmeter circuits, Wheatstone bridge.
Week 4: Hourly Exam 1; Techniques of general DC circuit analysis, Introduction to topological concepts.
Week 5: Node-voltge method, Mesh-current method, Source transformations.
Week 6: Thevenin and Norton equivalents, Maximum power transfer.
Week 7: Operational amplifiers; inverting, non-inverting, summing and difference amplifier circuits.
Week 8: Equivalent circuits of Op-Amp circuits, Common-mode rejection ratio.
Week 9: Hourly Exam 2; Properties of Inductances and capacitances.

Week 10: Series-parallel combinations of inductances and capacitances; Integrating and differentiating circuits (both passive and active), Concepts of transient and steady state response.
Week 11: Review of Complex variables, Introduction to sinusoidal steady state analysis, Sinusoidal sources, Phasors.
Week 12: Impedance, Admittance, Reactance, Susceptance, Series - parallel and Delta-Wye simplifications.
Week 13: Node-voltge method, Mesh-current method, Source transformations, Thevenin and Norton Equivalents, Phasor diagrams.
Week 14: Sinusoidal steady state power calculations, RMS values, Real and reactive power, Maximum power transfer, Frequency selective circuits.
Week 15: Review and Final Examination

Computer Usage: Students use the computer circuit-simulation program *P-Spice* and Matlab to do Home-Work and in Laboratory.

Laboratory Experiences: It is course IT06_Lab associated with this course.

Design Experiences: None

Independent Learning Experiences: Home-Work problems are assigned weekly, collected and graded.

Contribution to the Professional Component:
(a) College-level mathematics and basic sciences: 0.25 credit hours
(b) Engineering Topics (Science and/or Design): 2.75 credit hours
(c) General Education: 0 credit hours

Total credits: 3
Prepared by: Vinh Dang
Date: June 2008

International University, School of Computer Science and Engineering
ABET COURSE SYLLABUS
COURSE: IT207

Course Catalog Description: IT207 - Principles of Electrical Engineering 2 (3)
Passive and active filter circuit design, Butterworth filter design, transient analysis by classical methods and by Laplace Transform analysis, step and impulse response, two-port networks, Introduction to Fourier Series, three phase circuits.

Pre-Requisite Courses: IT206, MA101

Co-Requisite Courses: IT207Lab

Pre-Requisite by Topic:
1. Fundamentals of circuit analysis
2. Solution of linear algebraic equations
3. Matrix operations and inverse of a matrix
4. Complex variables
5. Differential calculus
6. Integral calculus

Textbook & Materials: J. W. Nilsson and S. A. Riedel, *Electric Circuits,* 8th Ed., Prentice Hall, 2007, and class notes

References: *MatLab: Student Version,* Current Edition, The Math Works, Inc..

Overall Educational Objective: To study passive and active filter circuit design, Transient analysis of circuits, Laplace Transforms, Two-port networks, Fourier Series, and Three Phase Circuits.

Course Learning Outcomes: A student who successfully fulfills the course requirements will have demonstrated:
1. an ability to calculate system responses by solving differential equations by classical methods
2. an ability to calculate system responses through the application of Laplace transforms
3. an ability to determine the mathematical model of linear time-invariant systems in s-domain
4. an ability to sketch the Bode diagrams for various transfer functions
5. an ability to design LPF, BPF, and HPF filters circuits (both passive and active) to meet the design specifications by utilizing a cascade of filter circuits or using Butterworth design concepts
6. an ability to understand and analyze different sets of two-port parameters
7. an ability to describe Fourier series analysis, and its uses
8. an ability to analyze three-phase circuits

How Course Outcomes are Assessed:
HW and quizzes (20 %)
Mid-Term Exams (30 %)
Final Exam (50 %)

N = none S = Supportive H = highly related

Outcome	Level	Proficiency assessed by
(a) an ability to apply knowledge of Mathematics, science, and engineering	H	HW Problems, Filter design, Exams
(b) an ability to design and conduct experiments and interpret data	S	HW Filter design and construction
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	N	
(d) an ability to function as part of a multi-disciplinary team	N	
(e) an ability to identify, formulate, and solve ECE problems	H	HW Problems, Filter design, Exams
(f) an understanding of professional and ethical responsibility	N	
(g) an ability to communicate in written and oral form	S	HW Problems, Filter design report
(h) the broad education necessary to understand the impact of electrical and computer engineering solutions in a global, economic, environmental, and societal context	N	
(i) a recognition of the need for, and an ability to engage in life-long learning	S	Take-Home Filter design
(j) a knowledge of contemporary issues	N	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for computer science and engineering practice engineering practice	H	HW Problems, Filter design, Exams
Basic disciplines in Computer Science	N	
Depth in Computer Science	N	
Basic disciplines in Information Technology	N	
Depth in Information Technology	N	
Basic disciplines in Computer Engineering	H	HW Problems, Filter design,
Depth in Computer Engineering	S	HW Problems, Filter design,
Laboratory equipment and software tools	S	HW Problems, Take-Home design
Variety of instruction formats	S	Lecture, office hour discussions

Topics covered week by week:

Week 1: Frequency selective circuits, Frequency response, Bode diagrams; phase angle plots.
Week 2: Parallel and series resonant circuits, filter circuits, frequency response of Op Amp circuits.
Week 3: Distortion in filter circuits, Active filter circuit design, design project.
Week 4: Butter-Worth filter design, Hourly Exam **1.**
Week 5: Introduction to transient response of circuits, solution to 1st order differential equations, RL and RC with independent and dependent sources; Sequential switching; examples; design problem.

Week 6: Differential equations for circuits with two energy storage elements, solution of the 2nd order differential equations, roots of characteristic equation in the complex plane, Complete response of RLC series and parallel circuits, state variable approach, frequency response.
Week 7: Unit Step and Impulse functions.
Week 8: Laplace Transforms and its properties.
Week 9: Inverse Laplace transforms, partial fraction expansions. Hourly Exam 2.
Week 10: Analysis of circuits in Laplace domain, step and impulse response.
Week 11: Analysis of two-port networks.
Week 12: Analysis of two-port networks (continued), introduction to Fourier series.
Week 13: Fourier series.
Week 14: Fourier series.
Weeks 15-16: Review and Final Examination

Computer Usage: Students use the computer circuit-simulation program *P-Spice* and Matlab to do Home-Work, to design filters, and in Laboratory.

Laboratory Experiences: It is course IT07_Lab associated with this course.

Design Experiences: Design of Filters within realistic constraints such as economic, manufacturability, and sustainability (a take home project).

Independent Learning Experiences: 1. Home-Work problems are assigned weekly, collected and graded, and 2. Take home filter design project as discussed above.

Contribution to the Professional Component:
(a) College-level mathematics and basic sciences: 0.25 credit hours
(b) Engineering Topics (Science and/or Design): 2.75 credit hours
(c) General Education: 0 credit hours

Total credits: 3
Prepared by: Vinh Dang
Date: June 2008

International University, School of Computer Science and Engineering
ABET COURSE SYLLABUS
COURSE: IT208

Course Catalog Description:	IT208 - Digital Logic Design (3) Binary arithmetic, Boolean algebra, K-maps, Combinational circuit synthesis, Combinational MSI circuits, Sequential logic, Synchronous state machine design, Sequential MSI circuits.
Pre-Requisite Course:	None
Co-Requisite Course:	IT208Lab
Textbook & Materials:	J.F. Wakerly: Digital Design Principles & Practices, 4th Ed., Prentice Hall, 2004; class and recitation notes.
References:	The OneKey access from Prentice Hall can be helpful to solve the homework problems.
Overall Educational Objective:	To introduce the basic tools for design with combinational and sequential digital logic and state machines. To learn simple digital circuits in preparation for computer engineering.
Course Learning Outcomes:	A student who successfully fulfills the course requirements will have demonstrated: 1. An ability to define different number systems, binary addition and subtraction, 2's complement representation and operations with this representation. 2. An ability to understand the different switching algebra theorems and apply them for logic functions. 3. An ability to define the Karnaugh map for a few variables and perform an algorithmic reduction of logic functions. 4. An ability to define the following combinational circuits: buses, encoders/decoders, (de)multiplexers, exclusive ORs, comparators, arithmetic-logic units; and to be able to build simple applications. 5. An ability to understand the bi-stable element and the different latches and flip-flops. 6. An ability to derive the state-machine analysis or synthesis and to perform simple projects with a few flip-flops. 7. An ability to understand sequential circuits, like counters and shift registers, and to perform simple projects with them.

How Course Outcomes are Assessed:
HW and quizzes (20 %)
Mid-Term Exam (30 %)
Final Exam (50%)

N = none S = Supportive H = highly related

Outcome	Level	Proficiency assessed by
(a) an ability to apply knowledge of mathematics, science, and engineering	H	R/HW problems, exams
(b) an ability to design and conduct experiments and interpret data	H	Design problems in R/HW, exams
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	S	Design problems in R
(d) an ability to function as part of a multi-disciplinary team	N	
(e) an ability to identify, formulate, and solve ECE problems	H	R/HW problems, exams
(f) an understanding of professional and ethical responsibility	S	HW, exams
(g) an ability to communicate in written and oral form	S	R, exams
(h) the broad education necessary to understand the impact of electrical and computer engineering solutions in a global, economic, environmental, and societal context	N	
(i) a recognition of the need for, and an ability to engage in life-long learning	S	R/HW, discussions during lectures
(j) a knowledge of contemporary issues	N	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for computer science and engineering practice	H	R/HW problems, exams
Basic disciplines in Computer Science	S	In the lectures
Depth in Computer Science	S	In the lectures
Basic disciplines in Information Technology	S	In the lectures
Depth in Information Technology	S	In the lectures
Basic disciplines in Computer Engineering	H	R/HW problems, exams
Depth in Computer Engineering	H	R/HW problems, exams
Laboratory equipment and software tools	H	R problems
Variety of instruction formats	S	Lecture, office hour discussions

R = recitation HW = homework

Topics Covered Week by Week:

Week 1: Organizational issues. Information revolution. Basic hardware concepts.

Week 2: Number systems, Binary addition, subtraction, Representation of negative numbers, 2's complement addition/subtraction.

Week 3: Switching algebra, Theorems, Standard representation of logic functions.

Week 4: Combinational circuits, Truth table, Karnaugh maps, Minimization techniques. **Week 5:** "Don't care" inputs, Five variable Karnaugh maps, Timing hazards.

Week 6: Documentation standards, Input/output circuits, Buses. TEST I.

Week 7: Encoders/Decoders. MUX/DMUX/XOR circuits.

Week 8: Comparators. Design examples with MSI. ALU and PLD circuits.

Week 9: Bi-stable elements. Latches and Flip-flops.
Week 10: State-machine design analysis and synthesis.
Week 11: State machine design examples. TEST II.
Week 12: Transition lists and ASM charts, Sequential MSI circuits, Switch debouncing. **Week 13:** Counters: serial and parallel, Design examples, Shift registers.
Week 14: Design of a one-lane traffic controller, Review.
Weeks 15 and 16: Final exam.

Computer Usage: Students use the computer as part of the co-requisite lab course.

Laboratory Experiences: It is course IT08_Lab associated with this course.

Design Experiences: A lot of the homework problems are in fact designing small circuits.

Independent Learning Experiences: Home-works and three exams.

Contribution to the Professional Component:

(a) College-level mathematics and basic sciences: 0.25 credit hours
(b) Engineering Topics (Science and/or Design): 2.75 credit hours
(c) General Education: 0 credit hours

Total credits: 3
Prepared by: Vinh Dang
Date: June 2008

COURSE SYLLABUS
for
Theoretical Models in Computing

Course Code: **No. of Credits: 4**
Instructor: ***Mai Duc Thanh, Ph.D.***

A. COURSE OVERVIEW:

1. **Course Objective**: To provide undergraduate students with mathematical reasoning, combinatorial analysis, algorithmic thinking and modeling, and automata theory as the study of abstract computing devices.
2. **Prerequisite:** None
3. **Major Contents**:

Algorithms, Mathematical Reasoning, Induction, and Recursion**,** Counting, Roots of Nonlinear Equations, Simultaneous Linear Equations, Interpolation, Numerical Differentiation and Integration, Differential Equations.

4. **Assessment**:

   Assignment and Class Attendance: 20%

   Midterm Test: 20%

   Final Exam: 60%

5. Documents**:**

   Main document: none

   References:

- J.E. Hopcroft, R. Motwani, J.D. Ullman, Introduction to Automata Theory, Languages, and Computation, Addison-Wesley, Boston, 2001
- K. Rosen, Discrete Mathematics and its Applications, McGraw-Hill, Fifth Edition, 2003

B. A DETAILED OUTLINE:

Chapter name	Descriptions
Chapter 1. **Algorithms, Mathematical Reasoning, Induction, and Recursion**	1.1 Algorithms 1.2 The growth of functions 1.3 The integers and divisions 1.4 Representation of integers 1.5 Mathematical Induction 1.6 Recursive Definitions and Structural Induction

	1.7 Recursive algorithms 1.8 Program Correctness
Chapter 2. **Counting**	2.1 Basic Rules 2.2 Pigeonhole principle 2.3 Permutations and Combinations 2.4 Binomial coefficients 2.5 Generalized Permutations and Combinations
Chapter 3. **Roots of Nonlinear Equations**	3.1 Bisection Method 3.2 Newton's Method 3.3 Secant Method 3.4 Fixed Point Iteration or Successive Substitution Method 3.5 Determination of Multiple Roots
Chapter 4. **Solutions of Simultaneous Linear Equations**	4.1 Background 4.2 Gauss Elimination Method 4.3 Gauss-Jordan Elimination Procedure 4.4 LU Decomposition Method 4.5 Jacobi Iteration Method 4.6 Gauss-Seidel Method 4.7 Relaxation Methods
Chapter 5. **Interpolation**	5.1 Lagrange Interpolation Formula 5.2 Newton's Divided-Difference Interpolating Polynomials 5.3 Interpolation using Splines 5.4 Least Squares Fitting
Chapter 6. **Numerical Differentiation and Integration**	6.1 Introduction 6.2 Basic Finite-Difference Approximations 6.3 Using Taylor's Series Expansions 6.4 Using Difference Operators 6.5 Using Differentiation of Interpolating Polynomials 6.6 Finite-Difference Approximations for Partial Derivatives 6.7 Trapezoid Rule - Composite Trapezoid Rule 6.8 Simpson's Rule - Composite Simpson's Rule

Chapter 7. Differential Equations	7.1 First-order linear differential equations 7.2 Higher-order Differential Equations and Simultaneous Differential Equations 7.3 Nonlinear differential equations 7.4 The Euler's Method 7.5 Improvements and Modifications of Euler's Method 7.6 Runge-Kutta Methods

Designed by: Dr. Mai Duc Thanh

Last updated: August 26th, 2008

International University, School of Computer Science and Engineering
ABET COURSE SYLLABUS
COURSE: IT23

Course Catalog Description: IT221 – Principles of Database Management (4)
Overview of Database management, architecture; Hierarchical, network, relational models; Entity-relationship data model, relational database design; Data dependencies and Normalization, security and integrity constraints; Transaction management for multi-user database systems; SQL Server and other commercial RDBMs.

Pre-Requisite Courses: IT204–Object-Oriented Programming

Textbook & Materials:

Abraham Silberschatz, Henry F. Korth, S. Sudarshan, *Database System Concepts*, 5th edition, McGraw-Hill, 2005

References:

Ramez Elmasri, *Fundamentals of Database Systems*, 5th Edition, Addison Wesley, 2006

Overall Educational Objective: To develop skills in understanding and evaluating the database systems, as well as to develop skills in designing and developing information systems using database.

Course Learning Outcomes: A student who successfully fulfills the course requirements will have demonstrated:

1. an in-depth understanding of fundamental knowledge and history of data management.
2. an in-depth understanding of data management models
3. an in-depth understanding of the entity-relationship model and all its characteristics
4. an ability to design database models for practical applications
5. an in-depth understanding of characteristics of popular commercial database products
6. an ability to install physical databases on a SQL server
7. an ability to develop simple applications that access data stored in database servers

How Course Outcomes are Assessed:

HW and quizzes (30 %)
Mid-Term Exam (20 %)
Final Exam (50%)

N = none S = Supportive H = highly related

Outcome	Level	Proficiency assessed by
(a) an ability to apply knowledge of Mathematics, science, and engineering	H	Exams
(b) an ability to design and conduct experiments and interpret data	H	HW Problems and Exams
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	H	HW Problems
(d) an ability to function as part of a multi-disciplinary team	S	HW Problems
(e) an ability to identify, formulate, and solve CSE problems	H	HW Problems and Exams
(f) an understanding of professional and ethical responsibility	S	HW Problems
(g) an ability to communicate in written and oral form	H	HW Problems

(h) the broad education necessary to understand the impact of computer science and engineering solutions in a global, economic, environmental, and societal context	S	HW Problems
(i) a recognition of the need for, and an ability to engage in life-long learning	S	Lectures, subsequent courses
(j) a knowledge of contemporary issues	S	HW Problems
(k) an ability to use the techniques, skills, and modern engineering tools necessary for computer science and engineering practice	H	HW Problems, Exams
Basic disciplines in Computer Science	H	HW Problems, Exams
Depth in Computer Science	H	HW Problems, Exams
Basic disciplines in Information Technology	H	HW Problems, Exams
Depth in Information Technology	S	HW Problems, Exams
Basic disciplines in Computer Engineering	N	
Depth in Computer Engineering	N	
Laboratory equipment and software tools	H	HW Problems, Laboratory
Variety of instruction formats	S	HW Problems, Lecture, Laboratory

Topics Covered week by week:

Week 1: Introduction to Database Systems
Week 2: Relational Model
Week 3: Structured Query Language
Week 4: Entity Relationship Model
Week 5: Entity Relationship Model (cont.)
Week 6: Relational Database Design
Week 7: Application Design and Development
Week 8: Midterm
Week 9: Database System Architecture and Transaction
Week 10: Advanced SQL
Week 11: Data Storage and Indexing
Week 12: Query Processing and Optimization
Week 13: Transaction Management
Week 14: Object-Oriented DB
Week 15: XML + Final Review

Computer Usage: Students use the computer as part of the course
Laboratory Experiences: Students use the computer in laboratory as part of the course.
Design Experiences: HW problems and exams in designing applications.
Independent Learning Experiences: HW problems.
Contribution to the Professional Component:

(a) College-level mathematics and basic sciences: 0.25 credit hours
(b) Engineering Topics (Science and/or Design): 3.75 credit hours
(c) General Education: 0 credit hours

Total credits: 4
Prepared by: Nguyen Duc Cuong
Date: May 2008

International University, School of Computer Science and Engineering
ABET COURSE SYLLABUS
COURSE: IT222

Course Catalog Description: IT222 – Object-Oriented Analysis and Design (4)
System modeling. System analysis and design paradigms. Product Life Cycle. Unified Process and its workflows: requirement, analysis, design, implementation, testing. Advanced topics: object-oriented databases, design patterns, Extreme Programming.

Pre-Requisite Courses: IT204-Object-Oriented Programming.

Textbook & Materials:

Stephen R. Schach, *An Introduction to Object-Oriented Systems Analysis and Design with UML and the Unified Process*, McGraw-Hill, 2004

References:

Craig Larman, *Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development* , Prentice Hall.
Grady Booch, *Object-oriented Analysis and Design with Applications*, 3rd edition, Prentice Hall, 2007.

Overall Educational Objective: To develop skills in analysis, designing and developing information systems using object-oriented methodology.

Course Learning Outcomes: A student who successfully fulfills the course requirements will have demonstrated:
1. an in-depth understanding of system modeling and development fundamentals.
2. an in-depth understanding of system development paradigms
3. an in-depth understanding of object-oriented methods, the unified process and its workflows
4. an ability to design and develop practical applications by object-oriented methods
5. an in-depth understanding of advanced topics as object-oriented database, design patterns, Extreme Programming.

How Course Outcomes are Assessed:
HW and quizzes (30 %)
Mid-Term Exam (20 %)
Final Exam (50%)

N = none S = Supportive H = highly related

Outcome	Level	Proficiency assessed by
(a) an ability to apply knowledge of Mathematics, science, and engineering	H	Exams
(b) an ability to design and conduct experiments and interpret data	H	HW Problems and Exams
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	H	HW Problems
(d) an ability to function as part of a multi-disciplinary team	S	HW Problems
(e) an ability to identify, formulate, and solve CSE problems	H	HW Problems and Exams
(f) an understanding of professional and ethical responsibility	S	HW Problems
(g) an ability to communicate in written and oral form	H	HW Problems
(h) the broad education necessary to understand the impact of	S	HW Problems

computer science and engineering solutions in a global, economic, environmental, and societal context		
(i) a recognition of the need for, and an ability to engage in life-long learning	S	Lectures, subsequent courses
(j) a knowledge of contemporary issues	S	HW Problems
(k) an ability to use the techniques, skills, and modern engineering tools necessary for computer science and engineering practice	H	HW Problems, Exams
Basic disciplines in Computer Science	H	HW Problems, Exams
Depth in Computer Science	H	HW Problems, Exams
Basic disciplines in Information Technology	H	HW Problems, Exams
Depth in Information Technology	S	HW Problems, Exams
Basic disciplines in Computer Engineering	N	
Depth in Computer Engineering	N	
Laboratory equipment and software tools	H	HW Problems, Laboratory
Variety of instruction formats	S	HW Problems, Lecture, Laboratory

Topics Covered week by week:

Week 1: Introduction to Information System – System Modeling Paradigms
Week 2: Object-Oriented Paradigm
Week 3: Requirement Workflow
Week 4: Analysis Workflow
Week 5: Analysis Workflow
Week 6: Design Workflow
Week 7: Case Studies
Week 8: Midterm
Week 9: Workflows and Phases of Unified Process
Week 10: More on UML and CASE
Week 11: Testing Workflow
Week 12: Maintain ace Workflow
Week 13: Design Patterns
Week 14: Object-oriented database
Week 15: Extreme Programming - Final Review

Computer Usage: Students use the computer as part of the course
Laboratory Experiences: Students use the computer in laboratory as part of the course.
Design Experiences: HW problems and exams in designing applications.
Independent Learning Experiences: NA
Contribution to the Professional Component:

(a) College-level mathematics and basic sciences: 0.5 credit hours
(b) Engineering Topics (Science and/or Design): 3.50 credit hours
(c) General Education: 0 credit hours

Total credits: 4
Prepared by: Nguyen Duc Cuong
Date: May 2008

International University, School of Computer Science and Engineering
ABET COURSE SYLLABUS
COURSE: IT310

Course Catalog Description:

IT310 - Systems and Signals (3)
Introduction to continuous- and discrete-time systems and signals, basis function representation of signals, convolution, Fourier Series, Fourier, Laplace, Z-transform theory, state space variable analysis of linear systems, basic feedback concepts.

Pre-Requisites Courses:

IT206 – Principles of EE1

Co-Requisites Courses:

IT310Lab - Linear Systems Lab

Pre-Requisite by Topic:

1.Basic electrical circuit laws
2.Complex variables
3.Differential equations
4.Linear algebra

Textbook:

B.P. Lathi, *Linear Dynamic Systems and Signals*, Oxford Press, 2001.

References:

Z. Gajic, *Linear Dynamic Systems and Signals*, Prentice-Hall, 2003.
H. Hsu, *Signals and Systems*, McGraw Hill's Schaum Series, 1995

Overall Educational Objective:

To develop skills to analyze linear dynamic systems in both continuous- and discrete-time, find the system response in both time and frequency domains, and examine system stability. To understand the use of the Fourier, Laplace, and Z transforms in analysis of signals and systems.

Course Learning Outcomes:

A student who successfully fulfils the course requirements will have demonstrated:
1. an ability to recognize, use, and analyze signals coming from diverse disciplines and represent them in terms of elementary signals such as step, ramp, parabolic, sinusoidal, and exponential signals.
2. an ability to understand basic signals operations such as convolution, correlation, signal shifting,
3. knowledge and understanding of linear system dynamics.
4. knowledge of methods for finding the system transient and steady state responses.
5. understanding of basic linear dynamic systems concepts such as stability, observability and controllability.
6. ability to represent and study linear systems in the state space form and build corresponding system block diagrams.
7. knowledge of main properties of linear feedback systems.
8. full understanding of Fourier, Laplace, and Z transforms and their inverses.

How Course Outcome are Assessed:
Quizzes (20%)
Mid-term exam (30%)
Final exam (50%)

N = none S = Supportive H = highly related

Outcome	Level	Proficiency assessed by
(a) an ability to apply knowledge of mathematics, science, and engineering	H	Quizzes, Exams
(b) an ability to design and conduct experiments and interpret data	N	
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	S	
(d) an ability to function as part of a multi-disciplinary team	N	
(e) an ability to identify, formulate, and solve ECE problems	H	Exams
(f) an understanding of professional and ethical responsibility	N	
(g) an ability to communicate in written and oral form	H	Quizzes, exams
(h) the broad education necessary to understand the impact of electrical and computer engineering solutions in a global, economic, environmental, and societal context	N	
(i) a recognition of the need for, and an ability to engage in life-long learning	S	Discussions during lectures
(j) a knowledge of contemporary issues	N	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for computer science and engineering practice	H	Exams
Basic disciplines in Computer Science	N	
Depth in Computer Science	N	
Basic disciplines in Information Technology	N	
Depth in Information Technology	N	
Basic disciplines in Computer Engineering	H	Quizzes, Exams
Depth in Computer Engineering	H	Quizzes, Exams
Laboratory equipment and software tools	S	MATLAB
Variety of instruction formats	S	Lecture, office hour discussions

Topics Covered Week by Week:

Week 1: Mathematical background; Time vs. Frequency domains; Common signals and delta impulse function
Week 2: Fourier series
Week 3: Fourier transform and its properties
Week 4: Fourier transform of common signals
Week 5: Laplace transform and its properties
Week 6: The inverse Laplace transform; Applications of the Laplace Transform
Week 7: The z-transform and its properties
Week 8: Continuous-time linear systems; Discrete-time linear systems
Week 9: Convolution of continuous- and discrete-time signals
Week 10: Impulse and step system responses
Week 11: State space representation of continuous-time systems
Week 12: State space representation of discrete-time systems

Week 13: Stability of continuous- and discrete-time systems
Week 14: System controllability, observability, and basic feedback concepts
Week 15: Review and Final Examination

Computer usage: MATLAB is used to demonstrate linear systems concepts and methods. MATLAB is also required for the corresponding linear system and signals laboratory.

Laboratory Experiences: It is course IT10_Lab associated with this course.

Design Experiences: The course is mostly analytical. However, students get some exposure to the design of transfer functions, block diagrams, and elementary feedback systems using MATLAB and Simulink.

Independent Learning Experience: Homework problems are assigned weekly with the solutions posted on the class website a week after. Homework problems are not graded, but the exams are based on homework. Students discuss homework solutions with the instructor during office hours.

Contribution to the Professional Component:
(a) College level mathematics and basic sciences: 0.5 credit hours.
(b) Engineering Topics (Science and/or Design): 2.5 credit hours
(c) General Education: 0 credit hours

Total credits: 3
Prepared by: Vinh Dang
Date: June, 2008

International University, School of Computer Science and Engineering
ABET COURSE SYLLABUS
COURSE: IT311

Course Catalog Description:	IT311 - Electronic Devices (3) Fundamentals of semiconductor devices and microelectronic circuits, characteristics of p-n, Zener diodes, and analog diode circuits. Principles of MOSFET and BJT operation, biasing, transistor analysis at midband frequencies.
Pre-Requisite Courses:	IT206, IT207
Co-Requisite Courses:	IT311Lab
Pre-Requisite by Topic:	1. Basic circuit analysis techniques 2. Frequency-domain and time-domain response of circuits 3. Two-port network parameters
Textbook & Materials:	A.S.Sedra and K.C. Smith, *Microelectronic Circuits, 5th edition,* Oxford University Press, 2004.
References:	K.C. Smith, KC's *Problems and Solutions for Microelectronic Circuits, 5th edition,* Oxford University Press G. Roberts and A.S. Sedra, *Spice, 2nd edition,* Oxford University Press
Overall Educational Objective:	1. To introduce students structures, physical operations, and circuit applications of basic semiconductor devices. 2. To provide students a base for a further study of analog and digital electronics, and to develop the ability to analyze and design electronic circuits.
Course Learning Outcomes:	A student who successfully fulfills the course requirements will have demonstrated: 1. An ability to define and analyze the four basic amplifiers models (voltage, current, transconductance and transresistance). Solve the amplifier's transfer functions and gain. 2. An ability to understand in depth the op amp as a circuit building block and its terminal characteristics for applications. 3. An ability to understand the essence of the diode function, grasp the techniques for the analysis of diode circuits through modeling the diode characteristics, use diodes for various applications, including in design of rectifier circuits. 4. An ability to develop a high degree of familiarity with the MOSFET: its physical structure and operation, terminal characteristics, circuit models, single - stage amplifier configurations and basic circuit applications, analyze and design the basic discrete MOSFET circuits. 5. An ability to analyze the BJT terminal characteristics, utilize the circuit models to perform the rapid first-order analysis of BJT circuits and to design single-stage BJT amplifiers.

How Course Outcomes are Assessed:
Quizzes (10 %)
Mid-Term Exams (40 %)
Final Exam (50 %)

N = none S = Supportive H == highly related

Outcome	**Level**	**Proficiency assessed by**
(a) an ability to apply knowledge of Mathematics, science,	H	HW Problems, Quizzes,
(b) an ability to design and conduct experiments and interpret data	S	Design problems in HW, Quizzes and Exams
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	N	
(d) an ability to function as part of a multi-disciplinary team	N	
(e) an ability to identify, formulate, and solve ECE problems	H	HW Problems, Quizzes, Exams
(f) an understanding of professional and ethical responsibility	N	
(g) an ability to communicate in written and oral form	S	HW Problems
(h) the broad education necessary to understand the impact of electrical and computer engineering solutions in a global, economic, environmental, and societal context	N	
(i) a recognition of the need for, and an ability to engage in life-long learning	S	Lectures, subsequent courses
(j) a knowledge of contemporary issues	N	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for computer science and engineering practice	H	HW (including problem solution simulation and design)
Basic disciplines in Computer Science	N	
Depth in Computer Science	N	
Basic disciplines in Information Technology	N	
Depth in Information Technology	N	
Basic disciplines in Computer Engineering	H	HW Problems, Filter
Depth in Computer Engineering	S	HW, Quizzes, Exams
Laboratory equipment and software tools	S	P-SPICE, MATLAB
Variety of instruction formats	S	Lectures, Problem sessions, Office hour discussions

Topics Covered week by week:

Week 1: Introduction. Analog and digital signals, amplifiers, circuit models for amplifiers, network theorems
Week 2: Operational Amplifiers, Ideal Op Amp, inverting & non-inverting configurations, Op Amp circuits, non-ideal performance
Week 3: Diodes, Ideal diode, terminal characteristics, analysis of diode circuits, small signal analysis
Week 4: PN junction under reverse-bias, PN junction under forward bias, zener diodes

Week 5: Diode applications, diode circuit design. Examination 1.
Week 6: Bipolar Junction Transistors; Physical structures and models of operation, PNP & NPN transistors
Week 7: DC analysis, BJT as an amplifier
Week 8: Single stage amplifier configurations; BJT in cut-off and saturation; BJT circuit applications and circuit design
Week 9: Examination 2; Field-Effect Transistors
Week 10: Structure and physical operation of enhancement-type and depletion type MOSFET
Week 11: FET circuit in DC
Week 12: FET as an amplifier, biasing circuits and biasing design; Basic configuration of single-stage FET amplifiers
Week 13: Basic configuration of single-stage FET amplifiers; FET circuit design
Week 14: CMOS and CMOS Applications
Weeks 15-16: Review and Final Examination

Computer Usage: Simulations using *P-Spice.*

Laboratory Experiences: There is course IT11_Lab associated with this course.

Design Experiences: ~30% Homework problems are design-oriented problems. In conjunction with the Lab course (14:332:363), students will learn the P-Spice software for simulation and design the circuits using diodes, MOSFETs and BJTs. ~20% problems in the Exams are design related.

Independent Learning Experiences: 1. Home-Work, 2.Computer-aided Simulation, 3.Testing (Quizzes, Exams)

Contribution to the Professional Component:
(a) College-level mathematics and basic sciences: 0.25 credit hours
(b) Engineering Topics (Science and/or Design): 2.75 credit hours
(c) General Education: 0 credit hours

Total credits: 3
Prepared by: Vinh Dang
Date: June 2008

International University, School of Computer Science and Engineering
ABET COURSE SYLLABUS
COURSE: IT312

Course Catalog Description: IT312 - Computer Architecture (4)
History and principles of computer architecture. Computer Organization, Assembly language and machine code, computer arithmetic, ALU design, computer performance, datapath and control, pipelining, memory hierarchy, I/O devices, multi-processor architectures, and mobile and multi-core processors.

Pre-Requisite Courses: IT102 – C/C++ Programming in Unix, IT208 – Digital Logic Design

Pre-Requisite by Topic:

1. Basic logic and state machine design.
2. Programming fundamentals such as data structures, algorithms and subroutines.
3. Number systems.

Textbook & Materials: Patterson, David A. and Hennessy, John L., *Computer Organization & Design*, Third Edition, Morgan Kaufmann Publishers, 2005, and class notes.

References: *The book CD*

Overall Educational Objective: To develop skills in understanding and evaluating the organization, operation and programming of current microprocessors and their peripherals, as well as to develop skills in designing basic processor components.

Course Learning Outcomes: A student who successfully fulfills the course requirements will have demonstrated:

1. an ability to define and explain the principles of computer architecture and the interfacing between its hardware and software components
2. an ability to write assembly programs (including recursive procedures) and understand its machine code equivalent
3. an in-depth understanding of architectural blocks involved in computer arithmetic, both integer and floating point.
4. an in-depth understanding of the data path inside a processor, its control and handling of exceptions
5. an in depth understanding of pipelining for 32-bit architectures, pipeline hazards and ways of fixing hazards.
6. an ability to understand and analyze computer memory hierarchy, at all levels of its organization, especially the interaction between caches and main memory
7. an ability to understand computer busses and input/output peripherals.
8. an ability to understand multi-processor architectures

How Course Outcomes are Assessed:
HW and quizzes (20 %)
Mid-Term Exam (30 %)
Final Exam (50%)

N = none S = Supportive H = highly related

Outcome	Level	Proficiency assessed by
(a) an ability to apply knowledge of Mathematics, science, and engineering	H	HW Problems, Exams
(b) an ability to design and conduct experiments and interpret data	S	Design Problems in HW and Exams
(c) an ability to design a system, component or process to	N	

meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability		
(d) an ability to function as part of a multi-disciplinary team	N	
(e) an ability to identify, formulate, and solve CSE problems	H	HW Problems, Exams
(f) an understanding of professional and ethical responsibility	N	
(g) an ability to communicate in written and oral form	S	HW Problems and Exams
(h) the broad education necessary to understand the impact of electrical and computer engineering solutions in a global, economic, environmental, and societal context	N	
(i) a recognition of the need for, and an ability to engage in life-long learning	S	Home-work, discussions during lectures
(j) a knowledge of contemporary issues	N	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for computer science and engineering practice	H	HW Problems, Exams
Basic disciplines in Computer Science	H	HW Problems
Depth in Computer Science	S	HW Problems
Basic disciplines in Information Technology	H	HW Problems
Depth in Information Technology	S	HW Problems
Basic disciplines in Computer Engineering	H	HW Problems
Depth in Computer Engineering	H	HW Problems
Laboratory equipment and software tools	S	HW Problems
Variety of instruction formats	S	Lecture

Topics Covered week by week:
Week 1: Introduction, history of computers, relation between hardware and software components of computer architecture
Week 2: Assembly language instructions
Week 3: Assembly language instructions
Week 4: Computer arithmetic principles and hardware.
Week 5: Computer performance including multi-core processors.
Week 6: Datapath and its control
Week 7: Datapath and its control
Week 8: Review and Midterm
Week 9: Microprocessor Pipelining
Week 10: Microprocessor Pipelining
Week 11: Memory hierarchy
Week 12: Memory hierarchy
Week 13: Input/Output devices and busses
Week 14: Input/Output devices and busses
Week 15: Multi-processors and Final review
Computer Usage: Students use the computer as part of the co-requisite lab course
Laboratory Experiences: It is course IT12_Lab associated with this course.
Design Experiences: HW problems and exams in designing circuits.
Independent Learning Experiences: NA
Contribution to the Professional Component:
(a) College-level mathematics and basic sciences: 0.25 credit hours
(b) Engineering Topics (Science and/or Design): 3.75 credit hours
(c) General Education: 0 credit hours
Total credits: 4
Prepared by:
Date: May 2008

International University, School of Computer Science and Engineering
ABET COURSE SYLLABUS
COURSE: IT313

Course Catalog Description: IT313 – Operating Systems (4)
To study fundamentals of operating systems and system programming using the functions and facilities of a modern operating system.

Pre-Requisite Courses: IT205 – Data Structures and Algorithms, IT102 - C/C++ Programming in Unix, IT312 – Computer Architecture

Pre-Requisite by Topic:

1. Programming fundamentals such as data structures, algorithms and subroutines.
2. Computer architecture

Textbook & Materials: Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, *Operating System Concepts*, 8th Edition, Wiley, 2008

References: William Stallings, *Operating Systems: Internals and Design Principles*, 6th Edition, Prentice Hall, 2008
Andrew S. Tanenbaum, *Modern Operating Systems*, 3rd Edition, Pearson Education, 2008

Overall Educational Objective: To develop skills in understanding and evaluating the organization, operation and programming of current main operating systems, as well as to develop skills in designing and developing basic system routines.

Course Learning Outcomes: A student who successfully fulfills the course requirements will have demonstrated:
1. an ability to define and explain the principles of an operating system and the interfacing between its hardware and software components
2. an in-depth understanding of architectural design of an operating system
3. an ability to write programs to control system functions and services

How Course Outcomes are Assessed:
HW and quizzes (20 %)
Mid-Term Exam (30 %)
Final Exam (50%)

N = none S = Supportive H = highly related

Outcome	Level	Proficiency assessed by
(a) an ability to apply knowledge of Mathematics, science, and engineering	H	HW Problems, Exams
(b) an ability to design and conduct experiments and interpret data	S	Design Problems in HW and Exams
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	N	
(d) an ability to function as part of a multi-disciplinary team	N	
(e) an ability to identify, formulate, and solve CSE problems	H	HW Problems, Exams
(f) an understanding of professional and ethical responsibility	N	
(g) an ability to communicate in written and oral form	S	HW Problems and Exams
(h) the broad education necessary to understand the impact of	N	

electrical and computer engineering solutions in a global, economic, environmental, and societal context		
(i) a recognition of the need for, and an ability to engage in life-long learning	S	Home-work, discussions during lectures
(j) a knowledge of contemporary issues	N	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for computer science and engineering practice	H	HW Problems, Exams
Basic disciplines in Computer Science	H	HW Problems
Depth in Computer Science	S	HW Problems
Basic disciplines in Information Technology	H	HW Problems
Depth in Information Technology	H	HW Problems
Basic disciplines in Computer Engineering	H	HW Problems
Depth in Computer Engineering	S	HW Problems
Laboratory equipment and software tools	S	HW Problems
Variety of instruction formats	S	Lecture

Topics Covered week by week:
Week 1: Introduction – Basic Concepts
Week 2: Shell Programming
Week 3: Low-Level I/O
Week 4: Standard I/O
Week 5: Programs and Processes
Week 6: Programs and Processes (cont.)
Week 7: Programs and Processes (cont.)
Week 8: Review and Midterm
Week 9: Signals and Signal Handlers
Week 10: Threads and Processes Synchronization
Week 11: Threads and Processes Synchronization (cont.)
Week 12: Interprocess communication
Week 13: Memory Management
Week 14: File Systems
Week 15: Final review

Computer Usage: Students use the computer as part of the co-requisite lab part.

Laboratory Experiences: It is laboratory part associated with this course.

Design Experiences: HW problems and exams in design system functions and services.

Independent Learning Experiences: NA

Contribution to the Professional Component:
(a) College-level mathematics and basic sciences: 0.5 credit hours
(b) Engineering Topics (Science and/or Design): 3.5 credit hours
(c) General Education: 0 credit hours
Total credits: 4
Prepared by:
Date: May 2008

International University, School of Computer Science and Engineering
SOFTWARE ENGINEERING COURSE SYLLABUS
COURSE: IT314

Course Catalog Description: IT314 - Software Engineering (3)
Software development lifecycle, object-oriented software engineering, system specification, software measurement and estimation, software design patterns.

Pre-Requisite Courses: IT204

Pre-Requisite by Topic:
1. Object-Oriented Programming

Textbook & Materials: "*Software Engineering*", Ian Sommerville, 7th Edition, Addison Wesley, 2004, ISBN 0-321-21026-3

References: *None*

Overall Educational Objective: The key objective of this course is to learn modular design of software and documenting the design using symbolic representations, i.e., UML diagrams. A great emphasis is on hands-on, team-based developing a demonstrable software packages.

Course Learning Outcomes: A student who successfully fulfills the course requirements will have demonstrated:
1. An ability to plan and execute lifecycle steps for developing a complex software product.
2. An ability to develop and document various analysis and design artifacts using UML, such as use cases and various structural and interaction diagrams.
3. An ability to formulate an effort estimation plan and perform the associated software measurements.
4. An ability to understand and apply software design patterns, so to design software that is easier to understand and maintain.

How Course Outcomes are Assessed:
HW and quizzes (30 %)
Mid-Term Exam (30 %)
Final Exam (40%)

N = none S = Supportive H = highly related

Outcome	**Level**	**Proficiency assessed by**
(a) an ability to apply knowledge of Mathematics, science, and engineering	H	Exams
(b) an ability to design and conduct experiments and interpret data	H	Term project
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	H	Term project
(d) an ability to function as part of a multi-disciplinary team	H	Term project
(e) an ability to identify, formulate, and solve CSE problems	H	Term project, Exams
(f) an understanding of professional and ethical responsibility	S	Term project
(g) an ability to communicate in written and oral form	H	Term project
(h) the broad education necessary to understand the impact of electrical and computer engineering solutions in a global, economic, environmental, and societal context	S	Term project
(i) a recognition of the need for, and an ability to engage in life-long learning	S	Lectures, subsequent courses

(j) a knowledge of contemporary issues	S	Term project
(k) an ability to use the techniques, skills, and modern engineering tools necessary for computer science and engineering practice	H	Term project (including software design and development)
Basic disciplines in Computer Science	H	Exams, Term project
Depth in Computer Science	H	Exams, Term project
Basic disciplines in Information Technology	H	Exams, Term project
Depth in Information Technology	S	Exams, Term project
Basic disciplines in Computer Engineering	H	Exams, Term project
Depth in Computer Engineering	S	Exams, Term project
Laboratory equipment and software tools	H	Term project
Variety of instruction formats	S	Lectures, Office hour discussions

Topics Covered week by week:
Week 1: Introduction
Week 2: Software processes
Week 3: Project management
Week 4: Software requirements
Week 5: Requirements engineering processes
Week 6: Requirements engineering processes & Review
Week 7: Midterm examination
Week 8: Architectural design
Week 9: Object-oriented design
Week 10: User interface design
Week 11: Verification and validation
Week 12: Software testing
Week 13: Managing people
Week 14: Software cost estimation
Weeks 15: Final examination

Computer Usage: Software design and documentation using UML; Software programming using programming languages and Web languages; SQL database management.

Laboratory Experiences: Software design, documentation, and programming in a semester-long programming project, working in teams 4-6 students.

Design Experiences: The term project is design-oriented in that students learn how to employ software design and lifecycle methodologies on a complex problem with real-world application. The project is also team-based, so students learn how to coordinate teamwork to accomplish much more than any individual student would be able to accomplish in a given time frame.

Independent Learning Experiences: 1. Term project in complex software development, 2.Testing (Exams)

Contribution to the Professional Component:
(a) College-level mathematics and basic sciences: 0.5 credit hours
(b) Engineering Topics (Science and/or Design): 2.5 credit hours
(c) General Education: 1 credit hours
Total credits: 3

Prepared by: Nguyen Thi Thanh Sang
Date: June 2008

International University, School of Computer Science and Engineering
ABET COURSE SYLLABUS
COURSE: IT323

Course Catalog Description: IT323 – Web Application Development (4)
Web programming concepts and models. HTML, Java Server Page, Java Bean, MVC model, Java utilities and development environments, extended Java frameworks as Ajax and Struts.

Pre-Requisite Courses: IT204-Object-Oriented Programming.

Textbook & Materials:

Marty Hall and Larry Brown, *Core Web Programming*, Second Edition, Prentice Hall, 2001
Marty Hall and Larry Brown, *Core Servlets and JavaServer Pages™, Volume 1: Core Technologies, Second Edition*, Prentice Hall, 2003
James L. Weaver, Kevin Mukhar, and Jim Crume, *Beginning J2EE 1.4: From Novice to Professional*, Apress, 2004.
Matthew Moodie, *Pro Apache Ant*, Apress, 2006
Sue Spielman, *The Struts Framework - Practical Guide for Java Programmers*, Morgan Kaufmann Publishers, 2003.

References:

Overall Educational Objective: To develop skills in understanding and evaluating web-based systems, as well as to develop skills in designing and developing web-based applications.

Course Learning Outcomes: A student who successfully fulfills the course requirements will have demonstrated:
1. an in-depth understanding of web programming concepts and models.
2. an ability to design and develop static web pages with HTML
3. an ability to design and develop dynamic web pages with Java Server Pages and Java Bean the in MVC model
4. an ability to manage and use Java utilities and development environments
5. an ability to manage and use XML and its utilities
6. an ability to design and develop dynamic web pages with extended Java frameworks as Ajax and Struts
7. an ability to develop simple applications that access data stored in database servers

How Course Outcomes are Assessed:
HW and quizzes (30 %)
Mid-Term Exam (20 %)
Final Exam (50%)

N = none S = Supportive H = highly related

Outcome	Level	Proficiency assessed by
(a) an ability to apply knowledge of Mathematics, science, and engineering	H	Exams
(b) an ability to design and conduct experiments and interpret data	H	HW Problems and Exams
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	H	HW Problems
(d) an ability to function as part of a multi-disciplinary team	S	HW Problems
(e) an ability to identify, formulate, and solve CSE problems	H	HW Problems and

		Exams
(f) an understanding of professional and ethical responsibility	S	HW Problems
(g) an ability to communicate in written and oral form	H	HW Problems
(h) the broad education necessary to understand the impact of computer science and engineering solutions in a global, economic, environmental, and societal context	S	HW Problems
(i) a recognition of the need for, and an ability to engage in life-long learning	S	Lectures, subsequent courses
(j) a knowledge of contemporary issues	S	HW Problems
(k) an ability to use the techniques, skills, and modern engineering tools necessary for computer science and engineering practice	H	HW Problems, Exams
Basic disciplines in Computer Science	H	HW Problems, Exams
Depth in Computer Science	H	HW Problems, Exams
Basic disciplines in Information Technology	H	HW Problems, Exams
Depth in Information Technology	S	HW Problems, Exams
Basic disciplines in Computer Engineering	N	
Depth in Computer Engineering	N	
Laboratory equipment and software tools	H	HW Problems, Laboratory
Variety of instruction formats	S	HW Problems, Lecture, Laboratory

Topics Covered week by week:

Week 1: Course Introduction - HTML
Week 2: HTML (cont.)
Week 3: HTML (cont.)
Week 4: Servlet
Week 5: Servlet
Week 6: Web Session
Week 7: Java Server Page
Week 8: Midterm
Week 9: Java Bean and MVC
Week 10: Java Script
Week 11: Ant
Week 12: XML & XSLT
Week 13: Ajax
Week 14: Struts
Week 15: Struts (cont.) + Final Review

Computer Usage: Students use the computer as part of the course
Laboratory Experiences: Students use the computer in laboratory as part of the course.
Design Experiences: HW problems and exams in designing applications.
Independent Learning Experiences: NA
Contribution to the Professional Component:

(a) College-level mathematics and basic sciences: 0.50 credit hours
(b) Engineering Topics (Science and/or Design): 3.50 credit hours
(c) General Education: 0 credit hours

Total credits: 4
Prepared by: Nguyen Duc Cuong
Date: May 2008

International University, School of Computer Science and Engineering
ABET COURSE SYLLABUS
COURSE: IT324

Course Catalog Description: IT324 – Computer Networks (4)
Introduction to Networks, OSI architecture, Packet Switching, Local Area Network, Ethernet, Wireless Network, Network Protocols

Pre-Requisite Courses: IT102 – C/C++ Programming in Unix, IT204 – Object-Oriented Programming

Pre-Requisite by Topic:

Textbook & Materials: James.F.Kurose, Keithw. Ross. *Computer Networking: A top Down – Course: Computer Network Approach Featuring Internet, 4/e*

References: A.Tanenbum, *Computer Networks,* Fourth Edition, Prentice Hall, 2003
Larry L.Peterson, Bruce S.Davie, *Computer Neworks: A System Approach*, Fourth Edition, Morgan Kaufman, 2007
Clyde F. Coombs, Catherine Ann Coombs, *Communications Network Test & Measurement Handbook*, McGraw Hill

Overall Educational Objective: To understand the principles of computer networks. Student will gain the knowledge of how to build a network concerning its scalability, reliability, effectiveness. Rather than explain how protocols work in an abstract way, student will study the real protocols design and practice

Course Learning Outcomes: A student who successfully fulfills the course requirements will have demonstrated:
1. an ability to understand what is a computer network
2. an in-depth understanding of network layers architecture
3. an ability to understand network protocols
4. an ability to assess the network performance
5. an ability to build an effective network

How Course Outcomes are Assessed:
HW and quizzes (30 %)
Mid-Term Exam (30 %)
Final Exam (40%)

N = none S = Supportive H = highly related

Outcome	Level	Proficiency assessed by
(a) an ability to apply knowledge of Mathematics, science, and engineering	H	HW Problems, Exams
(b) an ability to design and conduct experiments and interpret data	H	
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	H	
(d) an ability to function as part of a multi-disciplinary team	S	
(e) an ability to identify, formulate, and solve CSE problems	H	HW Problems, Exams

(f) an understanding of professional and ethical responsibility	N	
(g) an ability to communicate in written and oral form	S	HW Problems and Exams
(h) the broad education necessary to understand the impact of electrical and computer engineering solutions in a global, economic, environmental, and societal context	N	
(i) a recognition of the need for, and an ability to engage in life-long learning	S	Home-work, discussions during lectures
(j) a knowledge of contemporary issues	N	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for computer science and engineering practice	H	HW Problems, Exams
Basic disciplines in Computer Science	H	HW Problems, Lectures
Depth in Computer Science	S	Lectures
Basic disciplines in Information Technology	H	HW Problems, Lectures
Depth in Information Technology	H	HW Problems
Basic disciplines in Computer Engineering	S	HW Problems
Depth in Computer Engineering	S	HW Problems, Lectures
Laboratory equipment and software tools	S	HW Problems
Variety of instruction formats	S	Lectures

Topics Covered week by week:
Week 1: Introduction: building a network
Week 2: Direct Link Networks: Hardware, Encoding, Framing, Reliable Transmission
Week 3: Direct Link Networks: Ethernet, Token ring, Wireless
Week 4: Packet Switching
Week 5: Packet Switching
Week 6: Internetworking: IP, Routing
Week 7: Internetworking: Global Internet, Multicast, MPLS
Week 8: Review and Midterm
Week 9: End-to-End protocols
Week 10: End-to-End protocols
Week 11: End-to-End data
Week 12: Network Security
Week 13: Network Security
Week 14: Applications
Week 15: Final review

Computer Usage: Students use the computer as part of the co-requisite lab course

Laboratory Experiences: Laboratory is scheduled on a weekly basis

Independent Learning Experiences: Homework, assignments are given as part of the course

Contribution to the Professional Component:
(a) College-level mathematics and basic sciences: 0.25 credit hours
(b) Engineering Topics (Science and/or Design): 3.75 credit hours
(c) General Education: 0 credit hours
Total credits: 4
Prepared by: Le Thanh Son
Date: June 2008

International University, School of Computer Science and Engineering
ABET COURSE SYLLABUS
COURSE: IT416

Course Catalog Description:	IT416 - Digital Electronics (3) Principles of digital electronics, implementation of logic gates with MOSFETs and BJTs. Understanding and analysis of different logic families including NMOS CMOS, TTL and ECL. Fundamentals of digital memory circuits.
Pre-Requisite Courses:	IT311-Electronic Devices
Co-Requisite Courses:	Digital Electronics Laboratory.
Textbook & Materials:	Joeger and Blalock, Microelectronic Circuit Design, 2nd Ed, McGraw Hill, 2004
References:	1. A.S. Sedra and K.C. Smith, Microelectronic Circuits, 5th Ed, Oxford University Press, 2004. 2. G. Roberts and A.S. Sedra, Spice, 2nd Ed, Oxford University Press, 1996. 3. S. Kang and Y. Leblebici, "CMOS Digital Integrated Circuits", 3rd Edition, 2002
Overall Educational Objective:	1. To introduce students the implementation, analysis, and design of logic gates including NMOS, CMOS, TTL, ECL with MOSFETs and BJTs. 2. To provide the basis for further study of digital system design, VLSI design and signal integrity.
Course Learning Outcomes:	A student who successfully fulfills the course requirements will have demonstrated: 1. An ability to understand basic parameters of a logic inverter. 2. An ability to analyze and design an NMOS logic inverter with a resistive load, an enhancement NMOS load or a depletion NMOS load. 3. An ability to analyze and design a CMOS logic inverter. 4. An ability to analyze a TTL and ECL logic inverter. 5. An ability to understand the operation of latch circuit and flip-flop circuits. 6. An ability to understand the operation of different types of semiconductor memories.

How Course Outcomes are Assessed:
HW and quizzes (20 %)
Mid-Term Exam (30 %)
Final Exam (50%)

N = none S = Supportive H = highly related

Outcome	Level	Proficiency assessed by
(a) an ability to apply knowledge of Mathematics, science, and engineering	H	HW Problems, Quizzes, Exams
(b) an ability to design and conduct experiments and interpret data	S	Design problems in HW, Quizzes and Exams
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	N	
(d) an ability to function as part of a multi-disciplinary team	N	
(e) an ability to identify, formulate, and solve ECE problems	H	HW Problems, Quizzes, Exams
(f) an understanding of professional and ethical responsibility	N	
(g) an ability to communicate in written and oral form	S	HW Problems
(h) the broad education necessary to understand the impact of electrical and computer engineering solutions in a global, economic, environmental, and societal context	N	
(i) a recognition of the need for, and an ability to engage in life-long learning	S	Lectures, subsequent courses
(j) a knowledge of contemporary issues	N	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for computer science and engineering practice	H	HW Problems, Extensive use of PSpice simulation
Basic disciplines in Computer Science	N	
Depth in Computer Science	N	
Basic disciplines in Information Technology	N	
Depth in Information Technology	N	
Basic disciplines in Computer Engineering	H	HW, Quizzes, Exams
Depth in Computer Engineering	S	HW, Quizzes, Exams
Laboratory equipment and software tools	S	PSpice
Variety of instruction formats	S	Lectures, Problem sessions, Office hour discussions

Topics Covered week by week:
Week 1 Digital IC general review. Design sequence. Review of RC circuits, Diodes, PN junction dynamics
Week 2 Bipolar Junction Transistor, static characteristics, dynamic switching model
Week 3 MOSFET device, basic equations, models for FETs switching speed
Week 4 NMOS inverter, resistive load
Week 5 NMOS inverter with active load, static performance, inverter switching
Week 6 CMOS structure, VTC, noise margin and power dissipation
Week 7 CMOS switching speed, cascaded buffer. IC family classification, introduction of saturated bipolar logic and un-saturated bipolar logic. Mid-term exam
Week 8 Logic gates using RTL, DTL, TTL circuits, VTC, noise margin, power dissipation
Week 9 Logic gates using ECL circuits. Performance comparison of CMOS and bipolar logic

circuits
Week 10 Design logic gates with CMOS, transistor sizing, TTL, ECL logic function gates Regenerative logic circuits. Basic bistable circuit, SR latch
Week 11 JK flip-flop, D flip-flop, CMOS flip-flop circuits, CMOS astable circuit
Week 12 Semiconductor memories, classification, ROM, SRAM, DRAM
Week 13 EPROM, EEPROM, FLASH, sense amplifier, row decoder, column decoder
Week 14 Advanced logic circuits, BiCMOS circuits, Review
Week 15 Final exam

Computer Usage: Simulations using *PSpice*.

Laboratory Experiences: There is a separate lab course associated with this course.

Design Experiences: ~30% of the homework. Many homework problems are design-oriented problems. In conjunction with the Lab course, students will learn the PSpice software for simulation and design of the logic circuits using resistors, diodes, MOSFETs and BJTs. ~30% problems in the Exams are design related.

Independent Learning:

Experiences:

1. Homework assignment
2. Computer-aided Simulation
3. Testing (Quizzes, Exams)

Contribution to the Professional Component:

1. College-level mathematics and basic sciences: 0.25 credit hours
2. Engineering Topics (Science and/or Design): 2.75 credit hours
3. General Education: 0 credit hours

Total credits: 3
Prepared by: Huynh Kha Tu
Date: June 2008

International University, School of Computer Science and Engineering
ABET COURSE SYLLABUS
COURSE: IT417

Course Catalog Description: IT417- Digital Systems Design (3)
Hardware description using the Verilog language. Design methodologies for combinational and sequential logic circuits. Characteristics of microprocessors, fault-tolerant computer design, computer arithmetic, and
advanced state machine theory. Digital machine organization for testing and fault-tolerance.

Pre-Requisite Courses: IT206-Principles of Electrical Engineering I,
IT312-Computer Architecture and Assembly Language,

Co-Requisite Courses: None

Textbook & Materials: P. Lala, *Self-Checking and Fault-Tolerant Digital Design*, Morgan Kaufmann Publishers, 2001.
D. Thomas and P. Moorby, *The Verilog Hardware Description Language*, 5th Ed, Springer, 2002.
M. Bushnell and V. Agarwal, *Essentials of Electronic Testing for Digital Memory & Mixed-Signal VLSI Circuits*, Springer, 2000 (optional).

Overall Educational Objective: To prepare students for the design of practical digital hardware systems using Verilog.

Course Learning Outcomes: A student who successfully fulfills the course requirements will have demonstrated:
1. An ability to describe and design computer hardware using the Verilog hardware description language.
2. An ability to rapidly design combinational and sequential logic that works.
3. An ability to rapidly design complex state machines (present in all practical computers) that work.
4. An ability to design logic and state machines using an Automatic Logic Synthesis program.
5. An ability to implement state machines using Field-Programmable Gate Arrays.
6. An ability to design high-speed computer arithmetic circuits.
7. An ability to design a computer to be fault-tolerant.
8. An ability to design a computer memory using error-correcting codes.
9. An ability to design a computer so that it can test itself with built-in circuitry.

How Course Outcomes are Assessed:
HW and quizzes (20 %)
Mid-Term Exam (30 %)
Final Exam (50%)

N = none S = Supportive H = highly related

Outcome	Level	Proficiency assessed by
(a) an ability to apply knowledge of Mathematics, science, and engineering	H	HW Problems, Exams
(b) an ability to design and conduct experiments and interpret data	S	Design Problems in HW and Exams

(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	N	
(d) an ability to function as part of a multi-disciplinary team	N	
(e) an ability to identify, formulate, and solve ECE problems	H	HW Problems, Exams
(f) an understanding of professional and ethical responsibility	N	
(g) an ability to communicate in written and oral form	S	HW Problems
(h) the broad education necessary to understand the impact of electrical and computer engineering solutions in a global, economic, environmental, and societal context	N	
(i) a recognition of the need for, and an ability to engage in life-long learning	S	Home-work, discussions during Lectures
(j) a knowledge of contemporary issues	N	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for computer science and engineering practice	H	HW Problems, Exams
Basic disciplines in Computer Science	N	
Depth in Computer Science	N	
Basic disciplines in Information Technology	N	
Depth in Information Technology	N	
Basic disciplines in Computer Engineering	H	HW Problems, Exams
Depth in Computer Engineering	H	HW Problems, Exams
Laboratory equipment and software tools	S	HW Problems, Mid-Term Exams
Variety of instruction formats	S	Lecture, office hour discussions

Topics Covered Week by Week:
Week 1: Fault Tolerance Fundamentals and Triple Modular Redundancy
Week 2: Advanced Combinational Logic Design
Week 3: Verilog Language - Standard Combinational Logic
Week 4: Verilog Language - Concurrency and Sequential Logic
Week 5: Verilog Language - Tri-State Logic, Examples
Week 6: State Machines – Timing Analysis, False Paths, Counters
Week 7: State Machines – Synthesis to Handle Timing Delays, Asynchronous Inputs
Week 8: Exam I, State Machine Synchronizers
Week 9: Fault Tolerance -- Time and Information Redundancy
Week 10: Fault Tolerance -- Parity, Arithmetic, Cyclic and Hamming Codes
Week 11: Computer Arithmetic, Wallace Tree Multipliers and Dividers
Week 12: Testing, Fault Modeling and Test Generation , Hourly Exam II
Week 13: Built-In Self-Testing, Design for Testability
Week 14: Packaging and Rapid Prototyping – Microprocessor Design
Week 15: Final Examination

Computer Usage: Students use the Synopsys Design_Analyzer tool to synthesize hardware from Verilog hardware descriptions, and the Synopsys vs. behavioral/logic simulator to simulate the Verilog descriptions.

Laboratory Experiences: There are 10 Homework assignments that require students to use the circuit design software in the laboratory.

Design Experiences: The 10 Homework assignments are all hardware design experiences.

Independent Learning Experiences: The 10 Homework assignments.

Contribution to the Professional Component:

(a) College-level Mathematics and Basic Sciences: 0.0 credit hours

(b) Engineering Topics (Science and/or Design): 3.0 credit hours

(c) General Education: 0.0 credit hours

Total credits: 3

Prepared by: Huynh Kha Tu

Date: June 2008

International University, School of Computer Science and Engineering
ABET COURSE SYLLABUS
COURSE: IT426

Course Catalog Description:	IT426 - Network-Centric Programming (3) Advanced programming with a focus on developing software for networked systems using Linux as a reference platform. Topics: Programming Tools, Software Design, Programming Techniques, Environment of a UNIX Process, Memory Allocation, Garbage Collection, Process Control, Process Relationships, Signals, Reliable Signals, Threads, I/O Multiplexing, Datagram and Stream Sockets, Multicasting, Device Driver and Kernel Programming, Secure Programming.
Pre-Requisite Courses:	IT324 – Computer Networks
Textbook & Materials:	W. R. Stevens, B. Fenner, A. M. Rudoff, *Unix Network Programming, Vol. 1: The Sockets Networking API,* 3rd Ed., Addison-Wesley, 2003 and class notes.
References:	W. R. Stevens and S. Rago, *Advanced Programming in the UNIX(R) Environment*, 2nd Ed., Addison-Wesley, 2005.
Overall Educational Objective:	To introduce students to the development of network software using Linux as a reference platform, including a basic understanding of development at the kernel level. To create a foundation for further study and professional practice in software development.
Course Learning Outcomes:	A student who successfully fulfills the course requirements will have demonstrated: 1. An ability to develop both connection-oriented and connectionless network programs, define the difference between them, and to choose the appropriate primitive for different applications requirements. 2. An ability to understand the performance characteristics and implement both incremental and concurrent network servers using threads or processes. 3. An ability to understand the essence of security exploits. Preventing, discovering, and correcting security weaknesses in network software, in particular access control, buffer overflow, and SQL insertion. 4. An understanding of the Linux IO Multiplexing, process address space organization, and development tools. 5. The ability to understand and implement the key elements of the World Wide Web, the HTTP protocols and web servers.

How Course Outcomes are Assessed:

Homeworks & Quizzes (30%)

Mid-Term Exam (20 %)

Final Exam (50%)

N = none **S = Supportive** **H = highly related**

Outcome	Level	Proficiency assessed by
(a) an ability to apply knowledge of Mathematics, science, and engineering	H	HW Problems, Exams
(b) an ability to design and conduct experiments and interpret data	S	Design problems in HW and Exams
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	N	
(d) an ability to function as part of a multi-disciplinary team	N	
(e) an ability to identify, formulate, and solve ECE problems	H	HW Problems, Exams
(f) an understanding of professional and ethical responsibility	N	
(g) an ability to communicate in written and oral form	S	HW Problems, Class Discussions
(h) the broad education necessary to understand the impact of electrical and computer engineering solutions in a global, economic, environmental, and societal context	N	
(i) a recognition of the need for, and an ability to engage in life-long learning	S	Lectures, subsequent courses
(j) a knowledge of contemporary issues	S	HW Problems, Exams
(k) an ability to use the techniques, skills, and modern engineering tools necessary for computer science and engineering practice	H	HW (including problem solution simulation and design)
Basic disciplines in Computer Science	S	HW, Exams
Depth in Computer Science	S	HW, Exams
Basic disciplines in Information Technology	H	HW, Exams
Depth in Information Technology	H	HW, Exams
Basic disciplines in Computer Engineering	N	
Depth in Computer Engineering	N	
Laboratory equipment and software tools	H	Linux, GNU C Development Env.
Variety of instruction formats	S	Lectures, Laboratory problem sessions, Office hour discussions

Topics Covered week by week:

Week 1: Programming Tools: Static and Dynamic Libraries, Build Systems, Configuration Management, and Documentation Tools, Debuggers

Week 2: Advanced Programming Techniques: Programming Style, Modularity, Design Patterns, Debugging Techniques

Week 3: Process Address Space and Environment, Dynamic Memory Allocation, Garbage Collection

Week 4: Concurrency: Process Control and Relationships, Signals, Threads

Week 5: Concurrency: Synchronization primitives, hourly exam 1

Weeks 6 and 7: Sockets Network Programming: Stream and Datagram sockets, Server Design, I/O Multiplexing, Multicasting

Week 8: Web services: Remote procedure calls, Web servers, HTTP, XML, XSLT, SOAP, WSDL

Weeks 9 and 10: Kernel Development: Kernel Modules, Allocating Memory, Timers, Debugging Techniques, Kernel Network Stack, Socket Buffers, Netfilter

Weeks 11 and 12: Device Drivers: Interrupt Handling, Char, Block, and Network Drivers

Weeks 13 and 14: Secure Programming: Access Control, Buffer Overflow, Covert Channels, Secure Sockets

Weeks 15: Review

Computer Usage: Use of Linux in Homework assignments and exams.

Laboratory Experiences: All homeworks and exams require use of the computer laboratory.

Design Experiences: ~80% Homework problems are design-oriented problems, which require students to design and implement computer programs that meet specified requirements. ~80% problems in the Exams are design related.

Independent Learning Experiences: 1. Computer Programming Home-Work, 2.Testing (Quizzes, Exams)

Contribution to the Professional Component:

(a) College-level mathematics and basic sciences: 0 credit hours

(b) Engineering Topics (Science and/or Design): 3 credit hours

(c) General Education: 0 credit hours

Total credits: 3

Prepared by: Vo Thi Luu Phuong

Date: June 2008

International University, School of Computer Science and Engineering
ABET COURSE SYLLABUS
COURSE: IT427

Course Catalog Description: IT427 – Introduction to Artificial Intelligence (3)
This course provides a technical introduction of fundamental concepts of artificial intelligence (AI). Topics include: history of AI, agents, search (search space, uninformed and informed search, constraint satisfaction, game playing), knowledge representation (logical encodings of domain knowledge, logical reasoning systems), planning, and the language Lisp. The course is suitable for students who want to gain a solid technical background and as a preparation for more advanced work in AI.

Pre-Requisite Courses: IT204 - Object-Oriented Programming, MA205

Textbook & Materials:

Stuart Russell and Peter Norvig *Artificial Intelligence. A modern approach*, 2nd Edition, Prentice-Hall, 2003.

References:

Overall Educational Objective: To develop skills in understanding and evaluating intelligent systems, as well as to develop skills in designing practical applications using artificial intelligence techniques.

Course Learning Outcomes: A student who successfully fulfills the course requirements will have demonstrated:
1. an in-depth understanding what artificial intelligence is (and is not)
2. an in-depth understanding of fundamentals and techniques in artificial intelligence
3. an ability of designing practical applications using artificial intelligence techniques

How Course Outcomes are Assessed:
HW and quizzes (30 %)
Mid-Term Exam (20 %)
Final Exam (50%)

N = none S = Supportive H = highly related

Outcome	Level	Proficiency assessed by
(a) an ability to apply knowledge of Mathematics, science, and engineering	H	Exams
(b) an ability to design and conduct experiments and interpret data	H	HW Problems and Exams
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	H	HW Problems
(d) an ability to function as part of a multi-disciplinary team	S	HW Problems
(e) an ability to identify, formulate, and solve CSE problems	H	HW Problems and Exams
(f) an understanding of professional and ethical responsibility	S	HW Problems
(g) an ability to communicate in written and oral form	H	HW Problems
(h) the broad education necessary to understand the impact of computer science and engineering solutions in a global, economic, environmental, and societal context	S	HW Problems
(i) a recognition of the need for, and an ability to engage in life-long learning	S	Lectures, subsequent courses

(j) a knowledge of contemporary issues	S	HW Problems
(k) an ability to use the techniques, skills, and modern engineering tools necessary for computer science and engineering practice	H	HW Problems, Exams
Basic disciplines in Computer Science	H	HW Problems, Exams
Depth in Computer Science	H	HW Problems, Exams
Basic disciplines in Information Technology	N	
Depth in Information Technology	N	
Basic disciplines in Computer Engineering	N	
Depth in Computer Engineering	N	
Laboratory equipment and software tools	H	HW Problems, Laboratory
Variety of instruction formats	S	HW Problems, Lecture, Laboratory

Topics Covered week by week:

Week 1: Introduction. Intelligent Agents
Week 2: Intelligent Agents. Problem Spaces
Week 3: Search
Week 4: Heuristic Search
Week 5: Constraint Satisfaction
Week 6: Constraint Satisfaction – Game Playing
Week 7: Game Playing
Week 8: Midterm
Week 9: Propositional Logic
Week 10: First-Order Logic
Week 11: Inference in First-Order Logic
Week 12: Knowledge Representation
Week 13: Knowledge Representation
Week 14: Planning
Week 15: Planning - Final Review

Computer Usage: Students use the computer as part of the course

Laboratory Experiences:

Design Experiences: HW problems and exams in designing applications.

Independent Learning Experiences: NA

Contribution to the Professional Component:

(a) College-level mathematics and basic sciences: 0.25 credit hours
(b) Engineering Topics (Science and/or Design): 2.75 credit hours
(c) General Education: 0 credit hours

Total credits: 3

Prepared by: Nguyen Duc Cuong
Date: May 2008

International University, School of Computer Science and Engineering
ABET COURSE SYLLABUS
COURSE: IT428

Course Catalog Description: IT428 - Principles of Programming Languages (4)
The course is aimed at making the student familiar with the general concepts common to all programming languages so as to facilitate learning new languages. Language paradigms (i.e., logic, functional, procedural, object-oriented) are compared and implementation strategies are discussed.

Pre-Requisite Courses: IT204 - Object-Oriented Programming, MA205

Textbook & Materials: Michael L. Scott, *Programming Language Pragmatics*, Second Edition, 2006, and class notes.

References:

Overall Educational Objective: To develop skills in understanding general concepts of programming languages, as well as to develop skills in using all programming language families.

Course Learning Outcomes: A student who successfully fulfills the course requirements will have demonstrated:
1. an ability to define and explain the principles of programming language models
2. an in-depth understanding of implementation of programming languages
3. an ability to program in typical languages of main language families, such as Prolog, Haskel and scripting languages.

How Course Outcomes are Assessed:
HW and quizzes (25 %)
Mid-Term Exam (25 %)
Final Exam (50%)

N = none S = Supportive H = highly related

Outcome	Level	Proficiency assessed by
(a) an ability to apply knowledge of Mathematics, science, and engineering	H	Exams
(b) an ability to design and conduct experiments and interpret data	H	HW Problems and Exams
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	S	HW Problems
(d) an ability to function as part of a multi-disciplinary team	S	HW Problems
(e) an ability to identify, formulate, and solve CSE problems	H	HW Problems and Exams
(f) an understanding of professional and ethical responsibility	S	HW Problems
(g) an ability to communicate in written and oral form	H	HW Problems
(h) the broad education necessary to understand the impact of electrical and computer engineering solutions in a global, economic, environmental, and societal context	S	HW Problems
(i) a recognition of the need for, and an ability to engage in life-long learning	S	Lectures, subsequent courses
(j) a knowledge of contemporary issues	S	HW Problems
(k) an ability to use the techniques, skills, and modern engineering tools necessary for computer science and engineering practice	H	HW Problems, Exams

Basic disciplines in Electrical Engineering	H	HW Problems, Exams
Depth in Electrical Engineering	H	HW Problems, Exams
Basic disciplines in Computer Engineering	N	
Basic disciplines in Information Technology	N	
Depth in Information Technology	N	
Depth in Computer Engineering	N	
Laboratory equipment and software tools	H	HW Problems, Laboratory
Variety of instruction formats	S	HW Problems, Lecture, Laboratory

Topics Covered week by week:

Week 1: Introduction – Formal Languages
Week 2: Formal Languages (cont.)
Week 3: Logic Programming: Prolog
Week 4: Prolog (cont.)
Week 5: Prolog (cont.)
Week 6: Names-Bindings-Scope
Week 7: Names-Bindings-Scope (cont.)
Week 8: Review and Midterm
Week 9: Semantics-Memory-Management
Week 10: Semantics-Memory-Management (cont.)
Week 11: Parameter Passing mechanisms
Week 12: Types
Week 13: Functional Programming: Haskel
Week 14: Haskel (cont.)
Week 15: Scripting Languages and Final review

Computer Usage: Students use the computer as part of the course
Laboratory Experiences: Students use the computer in laboratory as part of the course.
Design Experiences: HW problems and exams in problem solving.
Independent Learning Experiences: HW problems.
Contribution to the Professional Component:

(a) College-level mathematics and basic sciences: 0.5 credit hours
(b) Engineering Topics (Science and/or Design): 3.5 credit hours
(c) General Education: 0 credit hours

Total credits: 3
Prepared by:
Date: May 2008

International University, School of Computer Science and Engineering
ABET COURSE SYLLABUS
COURSE: IT451

Course Catalog Description: IT451 - Concepts in VLSI Design (3)
To introduce concepts of digital VLSI chip design.
Introductory digital VLSI chip design. CMOS technology, dynamic clocked logic, layout design rules, and analog MOSFET timing analysis.

Prerequisites: IT208-Digital Logic Design
IT312- Computer Architecture and Assembly Language
IT417- Digital Electronics (or co-requisite)

Co-requisites: **None**

Textbooks: M. Bushnell and V. Agrawal, *Essentials of Electronic Testing for Digital, Memory and Mixed-Signal VLSI Circuits*, Springer, 2000.
N. Weste and K. Eshraghian, *Principles of CMOS VLSI Design: A Systems Perspective*, 3rd Ed., Addison-Wesley, 2005.

How Course Outcomes are Assessed:

Labs (30%)

Homeworks (10%)

Mid-Term Exam (10%)

Final Exam (50%)

N = none S = Supportive H = highly related

Outcome	**Level**	**Proficiency assessed by**
(a) an ability to apply knowledge of Mathematics, science,	H	HW Problems, Quizzes,
(b) an ability to design and conduct experiments and interpret data	S	Design problems in HW, Quizzes and Exams
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	N	
(d) an ability to function as part of a multi-disciplinary team	N	
(e) an ability to identify, formulate, and solve ECE problems	H	HW Problems, Quizzes, Exams
(f) an understanding of professional and ethical responsibility	N	
(g) an ability to communicate in written and oral form	S	HW Problems
(h) the broad education necessary to understand the impact of electrical and computer engineering solutions in a global, economic, environmental, and societal context	N	
(i) a recognition of the need for, and an ability to engage in life-long learning	S	Lectures, subsequent courses
(j) a knowledge of contemporary issues	N	

(k) an ability to use the techniques, skills, and modern engineering tools necessary for computer science and engineering practice	H	HW (including problem solution simulation and design)
Basic disciplines in Computer Science	N	
Depth in Computer Science	N	
Basic disciplines in Information Technology	N	
Depth in Information Technology	N	
Basic disciplines in Computer Engineering	H	HW Problems, Filter
Depth in Computer Engineering	H	HW, Quizzes, Exams
Laboratory equipment and software tools	H	Chip design tools
Variety of instruction formats	S	Lectures, Problem sessions, Office hour discussions

Topics Covered week by week:

Week 1: Overview of VLSI and ULSI Technology, Automatic chip layout, Analog circuit simulation for digital circuit design, Structured design methodologies
Week 2: CMOS Processing Technology
Week 3: Computer-Aided-Design Tools, Automatic wire routing and layout compaction, Circuit simulation and automatic test pattern generation
Week 4: MOS Transistor Theory and Models
Week 5: Circuit Testing, Testing process, Stuck-at and delay-fault models
Week 6: Fault Simulation, Automatic redundant logic removal
Week 7: Design for Testability, Full and partial scan, Built-in self testing, Standard cell generators and channel routers
Week 8: Circuit Characterization, R, C and L estimation, Circuit switching, Gate transistor sizing
Week 9: CMOS Dynamic Circuit Logic Design
Week 10: Pre-Charged Busses: Circuit Characterization
Week 11: CMOS Multi-Phase Clocking Strategies
Week 12: MSI Subsystem Design: Adders, Counters, Multipliers, Multiplexors
Week 13: MSI Subsystem Design: RAM, ROM, ALU's, PLA's
Week 14: CMOS Static and Dynamic Power Consumption and Charge Sharing
Week 15: Review
Week 16: Final Examination

Computer usage: Extensive use of CAD software

Laboratory projects: (including major items of equipment and instrumentation used)
Simulation-based computer projects are used.

Prepared by: Huynh Kha Tu

Date: June 2008

International University, School of Computer Science and Engineering

ABET COURSE SYLLABUS

COURSE: IT452

Course Catalog Description:	IT452 - Digital Signal Processing (3) Introduction to digital signal processing, sampling and quantization, A/D and D/A converters, discrete time systems, convolution, z-transforms, transfer functions, digital filter realizations, fast Fourier transforms, filter design, and digital audio applications.
Pre-Requisite Courses:	IT310- Systems & Signals
Textbook & Materials:	1. Digital Signal Processing with field programmable Gate Arrays (Signal and Communication Technology), Uwe Meyer-Baese, Springer, 3rd edition, 2007, ISBN-10: 3540726128, ISBN-13: 978-3540726128. 2. James H. McClellan, Ronald W. Schafer, Mark A. Yoder, and Rose-Hulman, "Signal Processing First", Prentice Hall, ISBN: 0130909904, 1st Edition, 2003.
References:	*MatLab: Student Version*, Current Edition, The MathWorks, Inc.
Overall Educational Objective:	To introduce the basic principles, methods, and applications of digital signal processing, emphasizing its algorithmic, computational, and programming aspects.
Course Learning Outcomes:	A student who successfully fulfills the course requirements will have demonstrated: 1. Understanding of the two key DSP concepts of sampling and quantization, and the practical issues involved in sampling, aliasing, and analog reconstruction of signals, and in choosing and defining specifications for antialiasing prefilters and anti-image postfilters. 2. Understanding of the quantization process and some practical implementations of A/D and D/A converters, such as the conversion algorithm for bipolar two's complement successive approximation converters. 3. Understanding of basic discrete-time systems concepts, such as linearity, time-invariance, impulse response, convolution, FIR and IIR filters, causality, stability, z-transforms, transfer functions, frequency response, time constants, transient and steady-state response. 4. Understanding of how to implement digital filters in software and hardware, using block processing methods based on convolution, or real-time sample-by-sample processing methods based on block diagram realizations that are implemented with linear or circular delay-line buffers.

5. Ability to translate a filter's transfer function into blockdiagram realizations, such as direct, canonical, transposed, and cascade forms. And conversely, the ability to start with a given block diagram, determine its transfer function, and translate it into a real-time processing algorithm implementable in software or hardware.

6. Understanding of various digital filter design methods meeting prescribed specifications, such as pole/zero placement or bilinear transformation methods, and appreciating design tradeoffs between the specifications and filter order, time constant, and pole locations.

7. Understanding of the discrete Fourier transform and the fast Fourier transform and their use in spectral analysis, data compression, and fast convolution. Understanding of the tradeoffs between frequency resolution and signal duration and the use of windows for reducing frequency leakage. Ability to perform short FFTs by hand.

How Course Outcomes are Assessed:

Labs (30%)

Homeworks (10%)

Mid-Term Exam (10%)

Final Exam (50%)

N = none S = Supportive H = highly related

Outcome	Level	Proficiency assessed by
(a) an ability to apply knowledge of Mathematics, science, and engineering	H	HW Problems, Exams
(b) an ability to design and conduct experiments and interpret data	S	Design Problems in HW, Exams, and in the DSP lab
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	S	Digital filter design examples meeting prescribed specifications
(d) an ability to function as part of a multi-disciplinary team	N	
(e) an ability to identify, formulate, and solve ECE problems	H	HW Problems, Exams
(f) an understanding of professional and ethical responsibility	N	
(g) an ability to communicate in written and oral form	S	HW Problems, Exams
(h) the broad education necessary to understand the impact of electrical and computer engineering solutions in a global,	N	

economic, environmental, and societal context		
(i) a recognition of the need for, and an ability to engage in life-long learning	S	Home-work, emphasized during lectures
(j) a knowledge of contemporary issues	S	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for computer science and engineering practice	H	HW Problems, Exams, Software and DSP hardware lab experience
Basic disciplines in Computer Science	N	
Depth in Computer Science	N	
Basic disciplines in Information Technology	N	
Depth in Information Technology	N	
Basic disciplines in Computer Engineering	H	HW Problems, Exams
Depth in Computer Engineering	H	HW Problems, Exams, Lab
Laboratory equipment and software tools	H	Analog Devices DSP-2181 digital signal processor. Programming in C, MATLAB, and DSP software development environment
Variety of instruction formats	S	Lecture, office hour discussions

Theory's topics Covered week by week:

Week 1: Sampling Theorem; sampling and aliasing of sinusoids; practical antialiasing prefilters.

Week 2: Analog reconstructors; anti-image postfilters; quantizaton; A/D and D/A converters; data formats for DSP chips.

Week 3: Review of discrete-time systems; linearity and time-invariance; stability and causality; convolution.

Week 4: Block processing convolution methods; Sample by sample processing methods; FIR filters.

Week 5: Software and hardware implementations of FIR filters; linear and circular delay-line buffers.

Week 6: Review of z-transforms; inverse z-transform methods; transfer functions.

Week 7: Transfer function analysis of FIR and IIR filters; frequency response; pole/zero filter designs; transient and steady-state response; time constants; z-domain characterization of stability and causality.

Week 8: Digital filter realization forms: direct, canonical, transposed, and cascade of second-order sections; hardware and software implementation of IIR filters using circular delay-line buffers.

Week 9: Noise reduction and signal enhancement applications.

Week 10: DSP applications in digital audio, such as multitap delays and reverberation effects.

Week 11: Discrete Fourier transform; spectral analysis; frequency resolution and windowing; Hamming windows.

Week 12: Fast Fourier transform; radix-2 decimation-in-time FFT algorithm.

Week 13: FIR digital filter design; course evaluations.

Week 14: IIR digital filter design;

Week 15: Review.

Lab's topics Covered week by week:

Week 1: General introduction to the laboratory.

Week 2 and 3: Introduction to hardware.

Week 4 and 5: Combinational SSI circuits.

Week 6 and 7: Combinational MSI circuits.

Week 8 and 9: Four bit arithmetic circuit.

Week 10 and 11: Sequential Circuits. State machine analysis.

Week 12 and 13: State machine synthesis.

Computer Usage: DSP algorithm programming in C, MATLAB, and Assembly Language.

Laboratory Experiences: Digital Signal Processing Laboratory

Design Experiences: HW problems in designing digital filters using various techniques. In conjunction with Digital Signal Processing Laboratory, designing and programming real-time audio signal processing algorithms on DSP hardware.

Independent Learning Experiences: 1. Home-Work, 2.MATLAB programming, 3.Testing (Exams)

Contribution to the Professional Component:

(a) College-level mathematics and basic sciences: 0.5 credit hours

(b) Engineering Topics (Science and/or Design): 2.5 credit hours

(c) General Education: 0 credit hours

Total credits: 3

Prepared by: Vo Thi Luu Phuong

Date: June 2008

International University, School of Computer Science and Engineering
ABET COURSE SYLLABUS
COURSE: IT453

Course Catalog Description:	IT453 - Digital Signal Processing Design (3) Applications of DSP algorithms in the areas of speech processing, image processing, radar, pattern recognition, and adaptive filtering using software implementations applied to realistic signals.
Pre-Requisite Courses:	IT452-Digital Signal Processing, IT310-Systems and Signals.
Co-Requisite Courses:	None
Textbook & Materials:	C.S. Burrus, J. H. McClellan, C. Sidney, A. V. Oppenheim, T. Parks, R.W. Schafer, H. W. Schuessler, Computer-Based Exercises for Signal Processing Using MATLAB, Prentice Hall, 2003.
References:	S.J. Orfanidis, Introduction to Signal Processing, Prentice Hall, 1996. R.G. Gonzalez, R.E. Woods, S.L Eddins "Digital Image Processing using Matlab, Prentice Hall, 2004.
Overall Educational Objective:	1.To introduce students to the software and hardware design principles involved in designing a DSP based system. 2. To provide students a base for a further study of DSP based systems.
Course Learning Outcomes:	A student who successfully fulfills the course requirements will have demonstrated: 1. An ability to analyze the spectrum of a signal using the DFT, FFT, spectral windows and sliding widows 2. An ability to understand in depth multirate processing including interpolation, decimation, and zooming 3. An ability to understand Stochastic signals including non-stationary, stationary and ergodic processes, linear systems and stochastic systems 4. An ability to use modern spectrum estimation techniques such as Maximum Entropy and methods based on linear prediction. 5. A familiarity with adaptive filtering methods in the context of linear prediction models 6. A familiarity with Radar concepts including LFM chirp signals, Range, and velocity processing methods 7. A familiarity with Speech Modeling techniques including speech segmentation, short time Fourier analysis, and vocal tract models 8. A familiarity with signal modeling based on linear prediction with applications in speech processing and spectral analysis of random processes 9. A familiarity with the design specifications of a DSP based product will be obtained by creating a business plan

How Course Outcomes are Assessed:
HW and quizzes (20 %)
Mid-Term Exam (30 %)
Final Exam (50%)

N = none S = Supportive H = highly related

Outcome	Level	Proficiency assessed by

(a) an ability to apply knowledge of Mathematics, science, and engineering	S	HW Problems and in-class assignments
(b) an ability to design and conduct experiments and interpret data	H	Design problems in Class and HW, Design and Development of Prototype
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	H	Creation of a business plan and prototype
(d) an ability to function as part of a multi-disciplinary team	H	Groups called companies are formed for each project
(e) an ability to identify, formulate, and solve ECE problems	H	Product design and implementation requires many ECE problems be solved
(f) an understanding of professional and ethical responsibility	H	Business Plan describes social Impact
(g) an ability to communicate in written and oral form	H	Business plan is written and presented orally
(h) the broad education necessary to understand the impact of electrical and computer engineering solutions in a global, economic, environmental, and societal context	H	The creation of the business plan requires broad analysis
(i) a recognition of the need for, and an ability to engage in life-long learning	S	Discussion of product life cycle in business plan
(j) a knowledge of contemporary issues	H	Business plan discusses current needs of the market
(k) an ability to use the techniques, skills, and modern engineering tools necessary for computer science and engineering practice	H	Rapid prototyping using Matlab and Simulink with the target systems based on Linux, Gate arrays or DSP chips
Basic disciplines in Computer Science	N	
Depth in Computer Science	N	
Basic disciplines in Information Technology	N	
Depth in Information Technology	N	
Basic disciplines in Computer Engineering	H	HW Problems, Exams
Depth in Computer Engineering	H	HW Problems, Exams, Lab
Laboratory equipment and software tools	H	MATLAB and SIMULINK
Variety of instruction formats	S	Lectures, Problem sessions, Office hour discussions

Topics Covered week by week:

Week 1: Signal and Systems: Sampling Theory, Difference Equations, Convolution summation, Time-Domain Speech Processing, Quantization effects

Week 2: The Discrete Fourier Transform: DFT Properties, DFT as a Matrix, Convolution (Circular and Block), Related Transforms, Direct Calculation of the DFT, The Cooley-Tukey FFT, Prime Factor FFTs, General-Length FFTs

Week 3: Spectrum Analysis: Spectral Windows, Sliding-Window DFT, Narrowband Signals

Week 4: Discrete-Time Filter Design: Discrete Design of FIR Filters, Least-Squares Design of FIR Filters, Chebychev Design of FIR Filters, Design of IIR Filters

Week 5: Radar and Sonar Signal Processing: General Description of System Components, Range Determination, Pulse Compression, Velocity Measurement, Doppler Radars, Angle-of-Arrival Determination
Week 6: Multi-rate Processing: Bandlimited Interpolation, Zoom Transform, Rate Changing
Week 7: Stochastic Signals: Psuedo-random noise generators, Stochastic Signals, FFT Spectrum Estimation, Modern Spectrum Estimation
Week 8: Signal Modeling with applications to speech: Linear Prediction, Linear Prediction of Speech, Exponential Modeling, Signal Estimation, Least-Squares Inversion
Week 9: Adaptive Filters and Signal Modeling: Wiener (Stochastic) Filtering, LMS Algorithm, Adaptive Equalization, Adaptive Arrays, Design of Adaptive Echo Cancellers
Weeks 10 and 11: Image Processing, Multidimensional Filters and Transforms, Image Models, Image Compression, Image Enhancement and Restoration, Image Segmentation
Weeks 12 - 14: Pattern Recognition: Statistical classifiers, Clustering, Training and testing, Feature extraction, Neural network classifiers
Week 15: Review
Week 16: Final Examination

Computer Usage: Simulations using *Matlab, Simulink and associated Datablocks*.

Laboratory Experiences: There are in class assignments using Matlab and Simulink DSP toolkits to filter and process signals.

Design Experiences: 50% of the design experience comes from In-class and homework assignments based on predetermined Matlab/Simulink simulations. The remaining 50% is based on a group design. The students create a product oriented design project by the end of the course which can be used as a capstone project. For example, a product was proposed by one group which used DSP image processing methods to aid in parallel parking a car. The product is designed with a detailed technical specification document, a marketing plan and financial projections are estimated for the product. Legal and environmental issues are also incorporated in the resulting business plan which presents the proposed product.

Independent Learning Experiences:

1. Home-Work, 2.Computer-aided Simulation, 3.Testing (Quizzes, Exams)

Contribution to the Professional Component:

(a) College-level mathematics and basic sciences: 0.25 credit hours
(b) Engineering Topics (Science and/or Design): 2.75 credit hours
(c) General Education: 0 credit hours
Total credits: 3

Prepared by: Huynh Kha Tu

Date: June 2008

International University, School of Computer Science and Engineering
ABET COURSE SYLLABUS
COURSE: IT454

Course Catalog Description: IT454- Embedded Systems (3)
Increasing integration of communications, multimedia and processing and relentless digitization of data (including even RF data) continues to expand the scope and complexity of embedded systems. To appreciate these advances, and to productively contribute to future advances of these systems, a *critical* appreciation of the underlying technology underpinning is a must.

Pre-Requisite Courses: IT312-Computer architecture

Co-Requisite Courses: None

Textbook & Materials: H. Kopetz, "Real-time Systems," Kluwer, 1997
Class lecture notes.

Overall Educational Objective: This course is designed to provide an introduction to embedded systems programming.
Students will investigate microcontroller selection, IDE selection, operating system considerations, programming selection and costs.

Course Learning Outcomes: A student who successfully fulfills the course requirements will have demonstrated:
1. An ability to develop a comprehensive understanding of the technologies behind the embedded systems, particularly, those using computing elements (processor, DSP, or ASSPs).
2. An ability to develop embedded components or systems and methods to evaluate design tradeoffs between different technology choices.

How Course Outcomes are Assessed:
Project (30 %)
Mid-Term Exam (20 %)
Final Exam (50%)

N = none S = Supportive H = highly related

Outcome	Level	Proficiency assessed by
(a) an ability to apply knowledge of Mathematics, science, and engineering	H	HW Problems, Exams
(b) an ability to design and conduct experiments and interpret data	S	Design Problems in HW and Exams
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	N	
(d) an ability to function as part of a multi-disciplinary team	N	
(e) an ability to identify, formulate, and solve ECE problems	H	HW Problems, Exams
(f) an understanding of professional and ethical responsibility	N	

(g) an ability to communicate in written and oral form	S	HW Problems
(h) the broad education necessary to understand the impact of electrical and computer engineering solutions in a global, economic, environmental, and societal context	N	
(i) a recognition of the need for, and an ability to engage in life-long learning	S	Home-work, discussions during Lectures
(j) a knowledge of contemporary issues	N	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for computer science and engineering practice	H	HW Problems, Exams
Basic disciplines in Computer Science	N	
Depth in Computer Science	N	
Basic disciplines in Information Technology	N	
Depth in Information Technology	N	
Basic disciplines in Computer Engineering	H	HW Problems, Exams
Depth in Computer Engineering	H	HW Problems, Exams
Laboratory equipment and software tools	S	HW Problems, Mid-Term Exams
Variety of instruction formats	S	Lecture, office hour discussions

Topics Covered Week by Week:
Week 1: Introduction to embedded systems: classification, characteristics and requirements.
Week 2: Timing and Clocks in Embedded Systems
Week 3: Task modeling and management.
Week 4: Real-time operating system issues.
Week 5: Signals: frequency spectrum, and sampling, digitalization (ADC, DAC).
Week 6: Signals: signal conditioning and processing.
Week 7: Modeling and characterization of embedded computing systems.
Week 8: Embedded Control and Control Hierarchy.
Week 9: Communication strategies for embedded systems: encoding, and flow control.
Week 10: Fault Tolerance
Week 11: Formal Verification
Week 12 to week 15: 2 Project presentations.

Computer Usage:

Laboratory Experiences:

Design Experiences:

Independent Learning Experiences:

Contribution to the Professional Component:

Total credits: 3

Prepared by:

Date: June 2008

International University, School of Computer Science and Engineering

ABET COURSE SYLLABUS

COURSE: IT455

Course Catalog Description: IT455 - Micro-Processing Systems (3)

Overview of microelectronic processing technology, lithography, etching, oxidation, diffusion, implantation and annealing, film deposition, epitaxy growth, metallization, process integration and simulation.

Pre-Requisite Courses: IT311- Electronic Devices

Textbook & Materials: 1. Jaeger, *Introduction to Microelectronic Fabrication*, 2nd Ed, Addison-Wesley, 2002.

2. S. Campbell, *The Science and Engineering of Microelectronic Fabrication*, 2nd Ed., Oxford University Press, 2001.

References: *MatLab: Student Version*, Current Edition, The MathWorks, Inc.

Overall Educational Objective: To introduce basic principles governing microelectronic processing technology.

How Course Outcomes are Assessed:

Homeworks & Quizzes (20%)

Mid-Term Exam (30%)

Final Exam (50%)

N = none S = Supportive H = highly related

Outcome	**Level**	**Proficiency assessed by**
(a) an ability to apply knowledge of Mathematics, science,	H	HW Problems, Quizzes,
(b) an ability to design and conduct experiments and interpret data	S	Design problems in HW, Quizzes and Exams
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	N	
(d) an ability to function as part of a multi-disciplinary team	N	
(e) an ability to identify, formulate, and solve ECE problems	H	HW Problems, Quizzes, Exams
(f) an understanding of professional and ethical responsibility	N	
(g) an ability to communicate in written and oral form	S	HW Problems

(h) the broad education necessary to understand the impact of electrical and computer engineering solutions in a global, economic, environmental, and societal context	N	
(i) a recognition of the need for, and an ability to engage in life-long learning	S	Lectures, subsequent courses
(j) a knowledge of contemporary issues	N	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for electrical and computer engineering practice	H	HW (including problem solution simulation and design)
Basic disciplines in Computer Science	N	
Depth in Computer Science	N	
Basic disciplines in Information Technology	N	
Depth in Information Technology	N	
Basic disciplines in Computer Engineering	H	HW Problems, Filter design, Exams
Depth in Computer Engineering	H	HW, Quizzes, Exams
Laboratory equipment and software tools	S	Simulation
Variety of instruction formats	S	Lectures, Problem sessions, Office hour discussions

Topics Covered week by week:

Week 1: Overview of Microelectronic Processing: Semiconductor Materials, Basic FET and BJT device structures, Safety in the cleanroom facility, SUPREM simulation tool
Week 2: Lithography and Etching: Photolithographic process, Photomask design and fabrication
Week 3: Thermal Oxidation: Physical Model and Process, Laboratory Project - Photolithography
Week 4: Thermal Oxidation: Selective Oxidation, Masking properties of SiO2, Simulation techniques
Week 5: Thermal Oxidation: Characterization, Laboratory Project - Oxidation
Week 6: Diffusion: Physical Models, Constant source diffusion, Limited source diffusion
Week 7: Diffusion: Process, Two-step diffusion, Successive diffusion, Solid-solubility
Week 8: Junction Formation and Characterization: Vertical and lateral diffusion, Process simulation, Laboratory Project - Diffusion
Week 9: Ion Implantation and Annealing: Physical Models
Week 10: Ion Implantation: Channeling, Furnace annealing, Rapid thermal annealing
Week 11: Ion Implantation: Simulation and Characterization, Laboratory Project – pn diodes
Week 12: Metallization Technology: Contacts, Ohmic contacts
Week 13: Process Integration: Physical Model, Laboratory Project – Device Processing: Design and Simulation
Week 14: Process Integration: Characterization
Week 15: Review

Computer Usage: Simulations using CAD software packages.

Design Experiences: None

Prepared by: Vo Thi Luu Phuong

Date: June 2008

International University, School of Computer Science and Engineering
ABET COURSE SYLLABUS
COURSE: IT461

Course Catalog Description: IT461 – Introduction to Distributed Computing (3)
Introduction to distributed system, Operating system service, remote procedure call, distributed objects, content distribution networks, concurrency control, transaction, distributed transaction

Pre-Requisite Courses: IT324 – Computer Networks

Pre-Requisite by Topic: Introduction to Networks and Communication

Textbook & Materials: Andrew S. Tanenbaum, Maaten Van Steen, *Distributed Systems: Principles and Paradigms*, Prentice Hall, Second Edition, 2007

References: None

Overall Educational Objective: To learn the most important characteristics of distributed systems, the problems and their solutions. Student also gain some experience in programming in distributed systems

Course Learning Outcomes: A student who successfully fulfills the course requirements will have demonstrated:
1. an ability to understand what is distributed system
2. an in-depth understanding of the most important characteristics of distributed systems
3. an ability to understand problems of the current distributed systems and their solution
4. an ability to write applications running in distributed systems

How Course Outcomes are Assessed:
HW and quizzes (30 %)
Mid-Term Exam (30 %)
Final Exam (40%)

N = none S = Supportive H = highly related

Outcome	Level	Proficiency assessed by
(a) an ability to apply knowledge of Mathematics, science, and engineering	S	HW Problems, Exams
(b) an ability to design and conduct experiments and interpret data	N	
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	N	
(d) an ability to function as part of a multi-disciplinary team	N	
(e) an ability to identify, formulate, and solve CSE problems	H	HW Problems, Exams
(f) an understanding of professional and ethical responsibility	N	
(g) an ability to communicate in written and oral form	S	HW Problems and Exams

(h) the broad education necessary to understand the impact of electrical and computer engineering solutions in a global, economic, environmental, and societal context	N	
(i) a recognition of the need for, and an ability to engage in life-long learning	S	Home-work, discussions during lectures
(j) a knowledge of contemporary issues	N	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for computer science and engineering practice	H	HW Problems, Exams
Basic disciplines in Computer Science	S	HW Problems, Lectures
Depth in Computer Science	S	Lectures
Basic disciplines in Information Technology	H	HW Problems, Lectures
Depth in Information Technology	H	HW Problems
Basic disciplines in Computer Engineering	N	HW Problems
Depth in Computer Engineering	N	HW Problems, Lectures
Laboratory equipment and software tools	S	HW Problems
Variety of instruction formats	S	Lectures

Topics Covered week by week:
Week 1: Introduction to Distributed Systems
Week 2: Operating System Support
Week 3: Remote Procedure Call (RPC)
Week 4: Distributed Objects
Week 5: Enterprise Computing
Week 6: Computer Security
Week 7: Distributed File Systems
Week 8: Review and Midterm
Week 9: Peer to Peer (P2P) service and overlay networks
Week 10: Content Distribution networks
Week 11: Replication: Availability and Consistency
Week 12: Shared data and transactions
Week 13: Concurrency control
Week 14: Distributed Transactions
Week 15: Final review

Computer Usage: Computers will be used for homework and assignments

Laboratory Experiences: None

Independent Learning Experiences: Homework, Projects

Contribution to the Professional Component:
(a) College-level mathematics and basic sciences: 0.25 credit hours
(b) Engineering Topics (Science and/or Design): 2.75 credit hours
(c) General Education: 0 credit hours
Total credits: 3
Prepared by: Le Thanh Son
Date: June 2008

International University, School of Computer Science and Engineering
ABET COURSE SYLLABUS
COURSE: IT462

Course Catalog Description: IT462 – System and Network Security (3)
Introduction to secret key systems, the role of cryptography in EDP, basic information theory, redundancy, data compression, perfect secrecy and data encryption standard (DES), communication security and file security, public key crypto system, RSA cryptosystems, authentication systems, digital signatures

Pre-Requisite Courses: IT324 – Computer Networks

Pre-Requisite by Topic: Introduction to computer networks and communication

Textbook & Materials: W. Stalling, *Cryptography and Network Security Principles and Practices*, Fourth Edition, Prentice Hall, 2005

References: C. Kaufman, R. Perlman, and M. Speciner, *Network Security: Private Communication in a Public World*, Second Edition, Prentice Hall, 2003

Overall Educational Objective: To provide solutions to secure the digital communication infra structure and networks. Both basic and advanced topics of system and network security will be introduced

Course Learning Outcomes: A student who successfully fulfills the course requirements will have demonstrated:
1. an ability to understand what system and network security
2. an in-depth understanding of basic security method
3. an ability to understand the mathematical methods applied to security
4. an ability to understand security protocols

How Course Outcomes are Assessed:
HW and quizzes (30 %)
Mid-Term Exam (30 %)
Final Exam (40%)

N = none S = Supportive H = highly related

Outcome	Level	Proficiency assessed by
(a) an ability to apply knowledge of Mathematics, science, and engineering	S	HW Problems, Exams
(b) an ability to design and conduct experiments and interpret data	N	
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	N	
(d) an ability to function as part of a multi-disciplinary team	N	
(e) an ability to identify, formulate, and solve CSE problems	H	HW Problems, Exams
(f) an understanding of professional and ethical responsibility	N	
(g) an ability to communicate in written and oral form	S	HW Problems and Exams

(h) the broad education necessary to understand the impact of electrical and computer engineering solutions in a global, economic, environmental, and societal context	N	
(i) a recognition of the need for, and an ability to engage in life-long learning	S	Home-work, discussions during lectures
(j) a knowledge of contemporary issues	N	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for computer science and engineering practice	H	HW Problems, Exams
Basic disciplines in Computer Science	S	HW Problems, Lectures
Depth in Computer Science	S	Lectures
Basic disciplines in Information Technology	H	HW Problems, Lectures
Depth in Information Technology	H	HW Problems
Basic disciplines in Computer Engineering	N	
Depth in Computer Engineering	N	
Laboratory equipment and software tools	S	HW Problems
Variety of instruction formats	S	Lectures

Topics Covered week by week:
Week 1&2: Classical Cryptosystems: Shift ciphers, Affine cipher, Vigenere Cipher, One-time pads, linear feedback shift registers
Week 3&4: Number Theory: Modular arithmetic, Modular exponentiation, Fermat and Euler theorem
Week 5&6: Public Key Cryptography: RSA algorithm, Primality testing, Factoring, Public Key Cryptosystems
Week 7: Digital Signatures: RSA signatures, ElGamal signatures, Hash functions (MD5 and SHA), Birthday attacks
Week 9&10: Secret Sharing Schemes: Secret splitting, Threshold schemes
Week 11&12: Key Establishment and Authentication Systems: Needham-Schroeder, Kerberos, Public Key Infrastructure, Password Systems and Unix Salt
Week 13&14: Information Theoretic Security: Probability, Bayes Theorem, Entropy, Conditional Entropy, Secrecy; Applications and Network Security: Networks and Routing, IPSEC, SSL/TLS, and Worm Modeling
Week 15: Final review

Computer Usage: Computers will be used for homework and assignments

Laboratory Experiences: None

Independent Learning Experiences: Homework, Term Project

Contribution to the Professional Component:
(a) College-level mathematics and basic sciences: 0.25 credit hours
(b) Engineering Topics (Science and/or Design): 2.75 credit hours
(c) General Education: 0 credit hours
Total credits: 3
Prepared by: Le Thanh Son
Date: June 2008

International University, School of Computer Science and Engineering
ABET COURSE SYLLABUS
COURSE: IT463

Course Catalog Description: IT463 – Network Design and Evaluation (3)
Internet application, application protocol, TCP congestion, mobile networks, network performance, next generation Internet

Pre-Requisite Courses: IT324 – Computer Networks

Pre-Requisite by Topic: Introduction to computer networks and communication

Textbook & Materials: J.F.Kurose, K.W.Ross, *Computer Neworking: A Top-Down Approach Featuring the Internet*, Fourth Edition, Addison Wesley, 2007

References: W.Stalling, *High-Speed Networks and Internets: Performance and Quality of Service*, Second Edition, Prentice Hall, 2002

Overall Educational Objective: How to design and manage a network effectively

Course Learning Outcomes: A student who successfully fulfills the course requirements will have demonstrated:
1. an ability to design a network effectively
2. an ability to manage a network
3. an ability to understand network Quality of Service

How Course Outcomes are Assessed:
HW and quizzes (30 %)
Mid-Term Exam (30 %)
Final Exam (40%)

N = none S = Supportive H = highly related

Outcome	Level	Proficiency assessed by
(a) an ability to apply knowledge of Mathematics, science, and engineering	S	HW Problems, Exams
(b) an ability to design and conduct experiments and interpret data	N	
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	N	
(d) an ability to function as part of a multi-disciplinary team	N	
(e) an ability to identify, formulate, and solve CSE problems	H	HW Problems, Exams
(f) an understanding of professional and ethical responsibility	N	
(g) an ability to communicate in written and oral form	S	HW Problems and Exams
(h) the broad education necessary to understand the impact of electrical and computer engineering solutions in a global, economic, environmental, and societal context	N	
(i) a recognition of the need for, and an ability to engage in life-long learning	S	Home-work, discussions during lectures

(j) a knowledge of contemporary issues	N	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for computer science and engineering practice	H	HW Problems, Exams
Basic disciplines in Computer Science	N	
Depth in Computer Science	N	
Basic disciplines in Information Technology	H	HW Problems, Lectures
Depth in Information Technology	H	HW Problems
Basic disciplines in Computer Engineering	N	
Depth in Computer Engineering	N	
Laboratory equipment and software tools	H	HW Problems
Variety of instruction formats	S	Lectures

Topics Covered week by week:
Week 1&2: Internetworking, IP addressing and design, CIDR and VLSM
Week 3&4: Routing algorithms & protocols, routing policies in the Internet, Routing in ad-hoc and wireless networks
Week 5: TCP and congestion control revision
Week 6&7: Synthesis of networking technologies, telco networks and SONET/SDH based systems
Week 8: Review and Midterm
Week 9: High-speed networks and ATM technologies
Week 10&11: Quality of Service
Week 11&12: DiffServ, MPLS, signalling and traffic
Week 13: TCP on next generation networks, new trends in transport protocols
Week 14: Multicast
Week 15: Final review

Computer Usage: Computers will be used for homework and assignments

Laboratory Experiences: Lab work will be provided base on Cisco CCNA

Independent Learning Experiences: Homework, assignments are given as part of the course

Contribution to the Professional Component:
(a) College-level mathematics and basic sciences: 0.25 credit hours
(b) Engineering Topics (Science and/or Design): 2.75 credit hours
(c) General Education: 0 credit hours
Total credits: 3
Prepared by: Le Thanh Son
Date: June 2008

International University, School of Computer Science and Engineering
COURSE SYLLABUS
COURSE: IT471

Course Catalog Description: IT471 – Project Management (3)
Fundamental software project management knowledge: plan-driven and agile methodologies, estimating techniques: wide-band, Delphi, parametric estimating; work-breakdown-structure, costs and budgeting, change management; risk management; earned value management, quality, monitoring and control; measurements and metrics, relationship and people issues, project close-out.

Pre-Requisite Courses: IT314-Software Engineering

Textbook & Materials: "*Applied Software Project Management",* Stellman and Greene, O'Reilly Media, 2006, ISBN 0-596-00948-8

References: *None*

Overall Educational Objective: This course provides students the fundamentals about management concepts, tools, techniques and practices that a project manager needs to know in order to run a software project or fix an ailing one. It covers the subjects on software project planning, estimation, scheduling, reviews, testing and models. It will also address issues of effective project change, leadership, and process improvement.

Course Learning Outcomes: Students will be assigned the task of revising the team project which was developed during course Software Engineering, to fit the practical information provided in the textbook of this course.

How Course Outcomes are Assessed:
HW and quizzes (30 %)
Mid-Term Exam (30 %)
Final Exam (40%)

N = none S = Supportive H = highly related

Outcome	**Level**	**Proficiency assessed by**
(a) an ability to apply knowledge of Mathematics, science, and engineering	H	Exams
(b) an ability to design and conduct experiments and interpret data	H	Term project
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	H	Term project
(d) an ability to function as part of a multi-disciplinary team	H	Term project
(e) an ability to identify, formulate, and solve CSE problems	H	Term project, Exams
(f) an understanding of professional and ethical responsibility	S	Term project

(g) an ability to communicate in written and oral form	H	Term project
(h) the broad education necessary to understand the impact of electrical and computer engineering solutions in a global, economic, environmental, and societal context	S	Term project
(i) a recognition of the need for, and an ability to engage in life-long learning	S	Lectures, subsequent courses
(j) a knowledge of contemporary issues	S	Term project
(k) an ability to use the techniques, skills, and modern engineering tools necessary for computer science and engineering practice	H	Term project (including software design and development)
Basic disciplines in Computer Science	H	HW Problems, Exams
Depth in Computer Science	H	HW Problems, Exams
Basic disciplines in Information Technology	S	HW Problems, Exams
Depth in Information Technology	S	HW Problems, Exams
Basic disciplines in Computer Engineering	S	Exams, Term project
Depth in Computer Engineering	S	Exams, Term project
Laboratory equipment and software tools	H	Term project
Variety of instruction formats	S	Lectures, Office hour discussions

Topics Covered week by week:
Week 1: Introduction & Software Project Planning
Week 2: Estimation & Project Schedules
Week 3: Software Requirement
Week 4: Reviews
Week 5: Design and Programming 1
Week 6: Software Testing
Week 7: Midterm - Examination
Week 8: Understanding Change
Week 9: Management and Leadership
Week 10: Managing an Outsourced Project
Week 11: Process Improvement
Week 12: Final Examination

Computer Usage: Software design and documentation using UML; Software programming using programming languages and Web languages; SQL database management.

Laboratory Experiences: Software design, documentation, and programming in a semester-long programming project, working in teams 4-6 students.

Design Experiences: The term project is design-oriented in that students learn how to employ software design and lifecycle methodologies on a complex problem with real-world application. The project is also team-based, so students learn how to coordinate teamwork to accomplish much more than any individual student would be able to accomplish in a given time frame.

Independent Learning Experiences: 1. Term project in complex software management, 2.Testing (Exams)

Contribution to the Professional Component:
(a) College-level mathematics and basic sciences: 0.25 credit hours
(b) Engineering Topics (Science and/or Design): 2.75 credit hours
(c) General Education: 0 credit hours
Total credits: 3
Prepared by: Sang
Date: June 2008

International University, School of Computer Science and Engineering
ABET COURSE SYLLABUS
COURSE: IT472

Course Catalog Description: IT472 – Computer Graphics (3)
Computer display systems, algorithms and languages for interactive computer graphics. 3D coordinate frame transformations. Vector, curve and surface generation. Lighting, Illumination and Shading. Camera models and image based rendering.

Pre-Requisite Courses: IT204 - Object-Oriented Programming.

Pre-Requisite by Topic:

Textbook & Materials:

Peter Shirley, Michael Asrikhim, M.Gleicher and S. Marschner, *Fundamentals of Computer Graphics*, 2nd Edition, A K Peters, 2005

References:

H. Bungarlz, M. Griebel, C. Zenger, *Introduction to Computer Graphics*, 2nd Edition, Charles Rives Media, 2004
N. Krishnamurthy, *Introduction to Computer Graphics*, McGraw-Hill, 2004
Daniel Selman, Java 3D Programming, Manning, 2002

Overall Educational Objective: To develop an understanding of the algorithms and fundamental techniques for generating and modifying pictures with a digital computer, including the handling of color, and the generation of visible-surface projections of three dimensional scenes, for applications in science, engineering, and the entertainment world.

Course Learning Outcomes: A student who successfully fulfills the course requirements will have demonstrated:
1. an ability to understand the algorithms and fundamental techniques for generating and modifying pictures with a digital computer
2. an ability to understand the handling of color, and the generation of visible-surface projections of three dimensional scenes, for applications in science, engineering, and the entertainment world.

How Course Outcomes are Assessed:
HW and quizzes (30 %)
Mid-Term Exam (20 %)
Final Exam (50%)

N = none S = Supportive H = highly related

Outcome	Level	Proficiency assessed by
(a) an ability to apply knowledge of Mathematics, science, and engineering	H	Exams
(b) an ability to design and conduct experiments and interpret data	H	HW Problems and Exams
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	H	HW Problems
(d) an ability to function as part of a multi-disciplinary team	S	HW Problems
(e) an ability to identify, formulate, and solve CSE problems	H	HW Problems and Exams

(f) an understanding of professional and ethical responsibility	S	HW Problems
(g) an ability to communicate in written and oral form	S	HW Problems
(h) the broad education necessary to understand the impact of computer science and engineering solutions in a global, economic, environmental, and societal context	S	HW Problems
(i) a recognition of the need for, and an ability to engage in life-long learning	S	Lectures, subsequent courses
(j) a knowledge of contemporary issues	S	HW Problems
(k) an ability to use the techniques, skills, and modern engineering tools necessary for computer science and engineering practice	H	HW Problems, Exams
Basic disciplines in Computer Science	S	HW Problems, Exams
Depth in Computer Science	H	HW Problems, Exams
Basic disciplines in Information Technology	S	HW Problems, Exams
Depth in Information Technology	S	HW Problems, Exams
Basic disciplines in Computer Engineering	S	HW Problems, Exams
Depth in Computer Engineering	S	HW Problems, Exams
Laboratory equipment and software tools	H	HW Problems, Laboratory
Variety of instruction formats	S	HW Problems, Lecture, Laboratory

Topics Covered week by week:

Week 1: Introduction to Computer Graphics – Hardware, Software, Firmware
Week 2: Bessenham algorithms
Week 3: Line clipping
Week 4: Polygon clipping
Week 5: Transformation
Week 6: Transformation (cont.)
Week 7: View Transformation
Week 8: Midterm
Week 9: 3D clipping
Week 10: Visual Surface Determination
Week 11: Color Models
Week 12: Image Rendering
Week 13: Texture Mapping
Week 14: Ray Tracing
Week 15: Graphics Engine - Final Review

Computer Usage: Students use the computer as part of the course
Laboratory Experiences: Students use the computer in laboratory as part of the course.
Design Experiences: HW problems and exams in designing applications.
Independent Learning Experiences: NA
Contribution to the Professional Component:

(a) College-level mathematics and basic sciences: 0.25 credit hours
(b) Engineering Topics (Science and/or Design): 2.75 credit hours
(c) General Education: 0 credit hours

Total credits: 3
Prepared by: Nguyen Duc Cuong
Date: May 2008

International University, School of Computer Science and Engineering
ABET COURSE SYLLABUS
COURSE: IT473

Course Catalog Description: IT473 – User Interface Design and Evaluation (3)
This class covers the theory, design, evaluation, and development process for interactive application interfaces. The course is built around a large design and evaluation project that is completed in groups. Topics include: human capabilities and limitations, the interface design and engineering process, prototyping, issues in interface construction, interface evaluation, and current topics such as information appliances and world wide web interface issues.

Pre-Requisite Courses: IT204- Object-Oriented Programming.

Textbook & Materials:

Donald Norman, *The Design of Everyday Things*, Basic Books, 2002
Debbie Stone, C. Jarrett, M. Woodroffe, and S. Minocha, *User Interface Design and Evaluation*, Morgan Kaufmann, 2005

References:

Overall Educational Objective: To develop skills in understanding and evaluating user interface of information systems, as well as to develop skills in designing user interface for practical applications.

Course Learning Outcomes: A student who successfully fulfills the course requirements will have demonstrated:
1. an in-depth understanding what user interface is (and is not) and its relationship to other development artifacts
2. an in-depth understanding of common tools and terminology related to user interface design
3. an ability of designing user interface for practical applications

How Course Outcomes are Assessed:
HW and quizzes (30 %)
Mid-Term Exam (20 %)
Final Exam (50%)

N = none S = Supportive H = highly related

Outcome	Level	Proficiency assessed by
(a) an ability to apply knowledge of Mathematics, science, and engineering	H	Exams
(b) an ability to design and conduct experiments and interpret data	H	HW Problems and Exams
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	H	HW Problems
(d) an ability to function as part of a multi-disciplinary team	S	HW Problems
(e) an ability to identify, formulate, and solve CSE problems	H	HW Problems and Exams
(f) an understanding of professional and ethical responsibility	S	HW Problems
(g) an ability to communicate in written and oral form	H	HW Problems
(h) the broad education necessary to understand the impact of computer science and engineering solutions in a global, economic, environmental, and societal context	S	HW Problems
(i) a recognition of the need for, and an ability to engage in	S	Lectures, subsequent

life-long learning		courses
(j) a knowledge of contemporary issues	S	HW Problems
(k) an ability to use the techniques, skills, and modern engineering tools necessary for computer science and engineering practice	H	HW Problems, Exams
Basic disciplines in Computer Science	S	HW Problems, Exams
Depth in Computer Science	H	HW Problems, Exams
Basic disciplines in Information Technology	S	HW Problems, Exams
Depth in Information Technology	S	HW Problems, Exams
Basic disciplines in Computer Engineering	S	HW Problems, Exams
Depth in Computer Engineering	S	HW Problems, Exams
Laboratory equipment and software tools	H	HW Problems, Laboratory
Variety of instruction formats	S	HW Problems, Lecture, Laboratory

Topics Covered week by week:

Week 1: Introduction – HCI and UI – UI Design Process
Week 2: HCI and Human Psychology
Week 3: User and Task Analysis
Week 4: Visual Design
Week 5: Cognitive Walkthrough
Week 6: Interaction Design - Desktop/windowing UI
Week 7: Heuristic Evaluation & Design Principles
Week 8: Midterm
Week 9: Web design, Navigation, Usability
Week 10: Universal Design
Week 11: Wizards
Week 12: Visualization
Week 13: Social and Natural UI's
Week 14: Institutionalizing Usability - Global UI's
Week 15: Project Presentations - Final Review

Computer Usage: Students use the computer as part of the course
Laboratory Experiences:
Design Experiences: HW problems and exams in designing applications.
Independent Learning Experiences: NA
Contribution to the Professional Component:

(a) College-level mathematics and basic sciences: 0.25 credit hours
(b) Engineering Topics (Science and/or Design): 2.75 credit hours
(c) General Education: 0 credit hours

Total credits: 3
Prepared by: Nguyen Duc Cuong
Date: May 2008

International University, School of Computer Science and Engineering
ABET COURSE SYLLABUS
COURSE: IT474

Course Catalog Description: IT474 – Software Architecture (3)
Provide a broad understanding of the software and systems architecture. The role of the architect and what role the architecture plays in relationship with the other phases of development and the organization itself.

Pre-Requisite Courses: IT222 - Object-Oriented Analysis and Design

Textbook & Materials:

Len Bass, Paul Clements and Rick Kazman, *Software Architecture in Practice*, 2nd Edition, Addison-Wesley Professional, 2003

Paul Clements et al., *Documenting Software Architectures: Views and Beyond*, Addison-Wesley Professional, 2002

References: Ian Gorton, Essential Software Architecture, Springer, 2006

Overall Educational Objective: To develop skills in understanding and evaluating architecture of information systems, as well as to develop skills in designing architecture for practical applications.

Course Learning Outcomes: A student who successfully fulfills the course requirements will have demonstrated:

1. an in-depth understanding what software architecture is (and is not) and its relationship to other development artifacts
2. an in-depth understanding of common tools and terminology related to software architecture
3. an in-depth understanding of the role of the Software Architect with a development project

How Course Outcomes are Assessed:

HW and quizzes (30 %)
Mid-Term Exam (20 %)
Final Exam (50%)

N = none S = Supportive H = highly related

Outcome	Level	Proficiency assessed by
(a) an ability to apply knowledge of Mathematics, science, and engineering	H	Exams
(b) an ability to design and conduct experiments and interpret data	H	HW Problems and Exams
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	H	HW Problems
(d) an ability to function as part of a multi-disciplinary team	S	HW Problems
(e) an ability to identify, formulate, and solve CSE problems	H	HW Problems and Exams
(f) an understanding of professional and ethical responsibility	S	HW Problems
(g) an ability to communicate in written and oral form	H	HW Problems
(h) the broad education necessary to understand the impact of computer science and engineering solutions in a global, economic, environmental, and societal context	S	HW Problems
(i) a recognition of the need for, and an ability to engage in life-long learning	S	Lectures, subsequent courses
(j) a knowledge of contemporary issues	S	HW Problems
(k) an ability to use the techniques, skills, and modern	H	HW Problems, Exams

engineering tools necessary for computer science and engineering practice		
Basic disciplines in Computer Science	H	HW Problems, Exams
Depth in Computer Science	H	HW Problems, Exams
Basic disciplines in Information Technology	S	HW Problems, Exams
Depth in Information Technology	S	HW Problems, Exams
Basic disciplines in Computer Engineering	N	
Depth in Computer Engineering	N	
Laboratory equipment and software tools	H	HW Problems, Laboratory
Variety of instruction formats	S	HW Problems, Lecture, Laboratory

Topics Covered week by week:

Week 1: Introduction Software Architecture & Its Environment
Week 2: Understanding Quality Attributes
Week 3: Achieving Quality Attributes
Week 4: Group Presentations
Week 5: The Component and Connector ViewType
Week 6: The Allocation ViewType
Week 7: Integrating the types of Views
Week 8: Midterm
Week 9: Group Presentations
Week 10: Analyzing Architectures
Week 11: Documenting Interfaces & Behavior
Week 12: Group Presentations
Week 13: Reuse and Extension to Multiple Systems
Week 14: Group Presentations
Week 15: Final Review

Computer Usage: Students use the computer as part of the course

Laboratory Experiences:

Design Experiences: HW problems and exams in designing applications.

Independent Learning Experiences: NA

Contribution to the Professional Component:

(a) College-level mathematics and basic sciences: 0.25 credit hours
(b) Engineering Topics (Science and/or Design): 2.75 credit hours
(c) General Education: 0 credit hours

Total credits: 3
Prepared by: Nguyen Duc Cuong
Date: May 2008

End