COURSE COUNSELING

(FOR YEARS 3 & 4 IN 2019-20)

Department of Information Engineering

April 15, 2019
OUTLINE

- IERG & MIEG Curricula
  - Major required & IE elective courses
- New IE courses
- IE courses offered in 2019-20
- IE Streams of Specialization
- Discussion on some courses
- Q&A
ENGG YEAR 1 MAJOR CORE

Semester 1
- MATH1510 Calculus
- PHYS1110/1003 Engineering Physics I
- ENGG1100 Engineering Design Lab

Semester 2
- ENGG1410 Engineering Mathematics I
- ENGG1110 Problem Solving by Programming

One more Faculty Science Course:
Chemistry Courses: CHEM1380
Life Science Courses: LSCI1001, 1003
Physics Courses: PHYS1110, ENGG1310
Other Courses: CSCI1120, CSCI1130
IERG/MIEG YEAR 2 MAJOR REQUIRED

**Semester 3**
- **ENGG2420 (ENGG2440)**
  Complex Numbers, Differential Equations & Discrete Mathematics
- **IERG2080 (2 units)**
  Intro. To System Programming
- **IERG2051 (IERG only)**
  Signals and Systems
- **IERG2060**
  Basic Analog and Digital Circuits
- **IERG1810**
  Electronic Circuits Laboratory
- **MATH1050**
  Foundations of Modern Mathematics
- **MATH2010**
  Advanced Calculus I

**Semester 4**
- **ENGG2470 (ENGG2430)**
  Probability for Engineers
- **IERG2602 (1 unit)**
  Engineering Practicum
- **CSCI2100**
- **Data Structure**
- **ENGG2310**
  Principles of Communication Systems
- **IERG3820**
  Communication Laboratory
- **IERG2051**
  Signals and Systems
- **MATH2020**
  Advanced Calculus II
<table>
<thead>
<tr>
<th>Semester 5</th>
<th>Semester 6</th>
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</thead>
<tbody>
<tr>
<td>IERG3310</td>
<td>IERG3060 (IERG only)</td>
</tr>
<tr>
<td>Computer Networks</td>
<td>Microcontrollers and Embedded Systems</td>
</tr>
<tr>
<td>IERG3800 (1 unit)</td>
<td>IERG3810 (IERG only)</td>
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<tr>
<td>Information</td>
<td>Microcontrollers and Embedded Systems Laboratory</td>
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<tr>
<td>Infrastructure</td>
<td></td>
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<tr>
<td>Design Lab</td>
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<tr>
<td>IERG3080</td>
<td>MATH2040</td>
</tr>
<tr>
<td>Software Engineering and Practices</td>
<td>Linear Algebra II</td>
</tr>
<tr>
<td>MATH2050</td>
<td>ENGG2310 If not yet taken in semester 4</td>
</tr>
<tr>
<td>Algebraic Structures</td>
<td>IERG3820</td>
</tr>
<tr>
<td>MATH2230</td>
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<tr>
<td>Complex Variables</td>
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<tr>
<td>with Applications</td>
<td>(IERG3060 &amp; IERG3810 are elective courses for MIEG)</td>
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</tbody>
</table>

(MIEG (additional)
Semester 7

- CSCI3160
  Design & Analysis of Algorithms
- IERG4998
  Final Year Project I

Semester 8

- IERG4999
  Final Year Project II

- Two-semester Final Year Project (FYP)
- Project selection in April for next academic year
- Professor suggested topics
- Student proposed topics
- Poster presentations in December and May
MAJOR ELECTIVES

- IERG: at least 17 units
  - At least 12 units from IE Major Elective List
  - The rest (5 units) can be either from IE Major Elective List or from 3000-coded courses from all other programmes under Engineering Faculty

- MIEG: at least 12 units from the given MIEG major elective lists.
### IE MAJOR ELECTIVES

- At least 17 units of IERG Major Electives
- At least 12 units from List of IE Major Electives

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>CSCI 3150</td>
<td>Introduction to Operating Systems</td>
</tr>
<tr>
<td>ENGG 1820</td>
<td>Engineering Internship</td>
</tr>
<tr>
<td>IERG 3010</td>
<td>Digital Communications</td>
</tr>
<tr>
<td>IERG 3050</td>
<td>Simulation and Statistical Analysis</td>
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<tr>
<td>IERG 3280</td>
<td>Networks: Technology, Economics, and Social Interactions</td>
</tr>
<tr>
<td>IERG 3300</td>
<td>Introduction to Stochastic Processes</td>
</tr>
<tr>
<td>IERG 3320</td>
<td>Social Media and Human Information Interaction</td>
</tr>
<tr>
<td>IERG 3830</td>
<td>Product Design Project</td>
</tr>
<tr>
<td>IERG 4030</td>
<td>Optical Communications</td>
</tr>
<tr>
<td>IERG 4080</td>
<td>Building Scalable Internet-based Services</td>
</tr>
<tr>
<td>IERG 4090</td>
<td>Network Protocols and Systems</td>
</tr>
<tr>
<td>IERG 4100</td>
<td>Wireless Communication Systems</td>
</tr>
</tbody>
</table>
IE MAJOR ELECTIVES

IERG 4110  Hands-on Wireless Communications
IERG 4130  Introduction to Cyber Security
IERG 4160  Image and Video Processing
IERG 4180  Network Software Design and Programming
IERG 4190  Multimedia Coding and Processing
IERG 4210  Web Programming and Security
IERG 4220  Secure Software Engineering
IERG 4230  Introduction to Internet of Things
IERG 4300  Web and Information Analytics
IERG 4330  Programming Big Data Systems
IERG 4340  Emerging Technologies in IE
IERG 4350  Cloud Computing Security
IERG 4831  Networking Laboratory I
IERG 4841  Networking Laboratory II
IE MAJOR ELECTIVES

IERG 5020  Telecommunication Switching and Network Systems
IERG 5090  Advanced Networking Protocols and Systems
IERG 5100  Advanced Wireless Communications
IERG 5130  Probabilistic Models and Inference Algorithms for Machine Learning
IERG 5140  Lightwave Networks
IERG 5154  Information Theory
IERG 5200  Channel Coding and Modulation
IERG 5230  Algorithms and Realization of Internet of Things Systems
IERG 5240  Applied Cryptography
IERG 5270  Advanced Topics in P2P Networks and Systems
IERG 5280  Mobile Networking
IERG 5290  Network Coding Theory
IERG 5300  Random Processes for Engineers
IERG 5310  Security & Privacy in Cyber Systems
IERG 5320  Digital Forensics
IERG 5330  Network Economics
IERG 5340  IT Innovation and Entrepreneurship
IERG 5590  Advances in Blockchains
MAJOR ELECTIVES FOR MIEG

- At least 12 units of MIEG Major Electives (Lists A & B), AND
- At least 9 units from List A

A. 
- CSCI2110 (or MATH3250), CSCI3130, 3150, 3230, 3320, 5320 (or MATH3260), ENG1820, IERG3010/ESTR3300, IERG3050, 3060, IERG3280/ESTR3302, IERG3300/ESTR3304 (or MATH4240), IERG3320/ESTR3306, IERG3810, 3830, 4030, IERG4080/ESTR4312, IERG4090/ESTR4302, IERG4100/ESTR4304, IERG4110/ESTR4314, IERG4130/ESTR4306, IERG4160, IERG4180/ESTR4308, IERG4190, 4210, 4220, 4230, IERG4300/ESTR4300[*ENGG4030], IERG4330/ESTR4316, IERG4340, IERG4831, 4841, 5020, IERG5040/ENG5392, IERG5090, IERG5100/ENG5303, IERG5130, 5140, IERG5154/ENG5301, IERG5200 (or MATH4260), IERG5230, IERG5240/ENG5383, IERG5270, 5280, 5290, IERG5300/ENG5302, IERG5310, 5320, 5330, 5340, 5590,

B. 
- MATH2060, 2070, 3010, 3030, 3040, 3070, 3080, 3093, 3215, 3230, 3270, 3290, 3310, 3320, 3330, 3360, 4010, 4020, 4030, 4230, 4280
NEW IE COURSES

IERG 4340  Emerging Technologies in IE
This course introduces emerging technologies in telecommunications and internet engineering. These new technologies are discussed and compared with conventional ones in terms of market demand, system requirements, design principles, applications, limitations and their impacts to society. The topics include telecommunication network infrastructure, advanced optical metro/access networks and wireless LTE technologies, fiber-wireless convergence, cloud/edge computing, software defined networking, network function virtualization, data center networking, smart automation systems, etc. The topics may vary. Case studies.

IERG 4350  Cloud Computing Security
The course aims to address the security issues in cloud computing so as to assure a secure and efficient cloud environment for dynamic business environment. The discussion includes the basics of cloud computing environment and its common threats and attacks, analysis of security architecture in various cloud services model and deployment model, various software-based security tools to monitor and protect the flow of information into and out of the cloud, identity and access management, patch management, data security controls and requirement, etc. The lectures are supplemented by substantial practical security implementation work and application development.

FTEC 4004 - E-payment Systems and Cryptocurrency Technologies
Courses on Telecommunications and Information Processing

- ENGG1410/2460/2430: Engineering Math
- IERG2051: Signals and Systems
- IERG2060: Basic Analog and Digital Circuits
- IERG3010: Digital Communications
- IERG3050: Simulation and Statistical Analysis
- IERG3060: Microcontrollers & Embedded Systems
- IERG3300: Stochastic Process
- IERG3810: Microcontrollers & Embedded Systems Lab
- IERG3820: Communication Laboratory
- IERG3830: Product Development Project
- IERG3880: Networks: Technology, Economics & Social Interactions
- IERG4020: Telecommunication Switching and Network Systems
- IERG4030: Optical Communications
- IERG4100: Wireless Communication Systems
- IERG4110: Hands-on Wireless Communications
- IERG4160: Image and Video Processing
- IERG4190: Multimedia Coding and Processing
- IERG4230: Introduction to Internet of Things
- IERG4230: Telecommunication Switching and Network Systems
- IERG5040: Lightwave System Technologies
- IERG5280: Mobile Networking
- IERG5290: Network Coding Theory
- IERG5300: Algorithms & Realization in IoT
Courses on Software, Computer Networking, Cyber Security, Big Data

- **IERG3320**: Social Media and Human Information Interaction
- **IERG3280**: Networks: Technology, Economics & Social Interactions
- **IERG3080**: Software Engineering and Practices
- **IERG3310**: Computer Networks
- **IERG2080**: Introduction to System Programming
- **CSCI2100**: Data Structures
- **CSCI3150**: Introduction to Operating Systems
- **IERG4300**: Web-scale Information Analytics
- **IERG4330**: Programming Big Data Systems
- **IERG4330**: Programming Big Data Systems
- **IERG4230**: Introduction to Internet of Things
- **IERG4220**: Secure Software Engineering
- **IERG4210**: Web Programming and Security
- **IERG4130**: Introduction to Cyber Security
- **IERG4080**: Building Scalable Internet-based Services
- **IERG4090**: Network Protocols and Systems
- **IERG4180**: Network Software Design and Programming
- **IERG4831/4841**: Networking Laboratories I/II
- **IERG5130**: Probabilistic Models and Inference Algorithms for Machine Learning
- **IERG5330**: Networks Economics
- **IERG5320**: Digital Forensics
- **IERG5310**: Security & Privacy in Cyber Systems
- **IERG5240**: Applied Cryptography
- **IERG5280**: Mobile Networking
- **IERG5270**: Advanced Topics in P2P Networks and Systems
- **IERG5090**: Advanced Networking Protocols and Systems
- **IERG5130**: Probabilistic Models and Inference Algorithms for Machine Learning
- **IERG4230**: Introduction to Internet of Things
IE MAJOR **REQUIRED & ELECTIVES** TO BE OFFERED IN 2019-20

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
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<tbody>
<tr>
<td>✓ IERG3010</td>
<td>✓ IERG5020</td>
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<tr>
<td>✓ IERG3050</td>
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<td>✓ IERG3080</td>
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<td>✓ IERG4831</td>
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<td>✓ IERG6120</td>
<td>✓ CSCI3150</td>
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<td>✓ IERG6300</td>
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IE STREAMS OF SPECIALIZATION

- Communications
- Internet Engineering
- Cyber Security
- Enrichment
- Big Data: Systems and Applications

- On voluntary basis.
- To qualify for a stream of specialization, the student must complete at least 12 units from the electives listed under the stream.
- A student who satisfies all the requirements of a stream of specialization may obtain a letter of certification from the department.
IE STREAMS OF SPECIALIZATION

**Communications**

IERG 3010  Digital Communications
IERG 3280  Networks: Technology, Economics, and Social Interactions
IERG 3300  Introduction to Stochastic Processes
IERG 4030  Optical Communications
IERG 4100  Wireless Communication Systems
IERG 4110  Hands-on Wireless Communications
IERG 4130  Introduction to Cyber Security
IERG 4230  Introduction to Internet of Things
IERG 4340  Emerging Technologies in IE
IERG 5020  Telecommunication Switching and Network Systems
IERG 5040  Lightwave System Technologies (ENGG5392)
IERG 5100  Advanced Wireless Communications (ENGG5303)
IERG 5200  Channel Coding and Modulation
IERG 5280  Mobile Networking
IERG 5230  Algorithms and Realization of Internet of Things Systems
IERG 5330  Network Economics
# IE STREAMS OF SPECIALIZATION

## Internet Engineering

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<td>IERG 4210</td>
<td>Web Programming and Security</td>
</tr>
<tr>
<td>IERG 4831</td>
<td>Networking Laboratory I</td>
</tr>
<tr>
<td>IERG 4841</td>
<td>Networking Laboratory II</td>
</tr>
<tr>
<td>IERG 5090</td>
<td>Advanced Networking Protocols and Systems</td>
</tr>
<tr>
<td>IERG 5270</td>
<td>Advanced Topics in P2P Networks and Systems</td>
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<tr>
<td>IERG 5280</td>
<td>Mobile Networking</td>
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IE STREAMS OF SPECIALIZATION

Cyber Security

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<td>CSCI 3150</td>
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<tr>
<td>IERG 4210</td>
<td>Web Programming and Security</td>
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<tr>
<td>IERG 4220</td>
<td>Secure Software Engineering</td>
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<tr>
<td>IERG 4350</td>
<td>Cloud Computing Security</td>
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<tr>
<td>IERG 5240</td>
<td>Applied Cryptography (ENGG5383)</td>
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<tr>
<td>IERG 5310</td>
<td>Security &amp; Privacy in Cyber Systems</td>
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<tr>
<td>IERG 5320</td>
<td>Digital Forensics</td>
</tr>
<tr>
<td>IERG 5590</td>
<td>Advances in Blockchains</td>
</tr>
</tbody>
</table>
IE STREAMS OF SPECIALIZATION

Enrichment

IERG 3010  Digital Communications
IERG 3050  Simulation and Statistical Analysis
IERG 3280  Networks: Technology, Economics, and Social Interactions
IERG 3300  Introduction to Stochastic Processes
IERG 4100  Wireless Communication Systems
IERG 4190  Multimedia Coding and Processing
IERG 4300  Web and Information Analytics
IERG 5154  Information Theory (ENGG5301)
IERG 5200  Channel Coding and Modulation
IERG 5270  Advanced Topics in P2P Networks and Systems
IERG 5290  Network Coding Theory
IERG 5300  Random Processes for Engineers (ENGG5302)
### IE STREAMS OF SPECIALIZATION

#### Big Data: Systems and Applications

<table>
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<tr>
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<tbody>
<tr>
<td>IERG 3320</td>
<td>Social Media and Human Information Interaction</td>
</tr>
<tr>
<td>IERG 4080</td>
<td>Building Scalable Internet-Based Services</td>
</tr>
<tr>
<td>IERG 4160</td>
<td>Image and Video Processing</td>
</tr>
<tr>
<td>IERG 4230</td>
<td>Introduction to Internet of Things</td>
</tr>
<tr>
<td>IERG 4300</td>
<td>Web-scale Information Analytics <em>(Required)</em></td>
</tr>
<tr>
<td>IERG 4330</td>
<td>Programming Big Data Systems</td>
</tr>
<tr>
<td>IERG 5130</td>
<td>Probabilistic Models and Inference Algorithms for Machine Learning</td>
</tr>
<tr>
<td>CSCI 3320</td>
<td>Fundamental of Machine Learning</td>
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<tr>
<td>CSCI 4180</td>
<td>Introduction to Cloud Computing and Storage</td>
</tr>
<tr>
<td>CSCI 4190</td>
<td>Introduction to Social Networks</td>
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<tr>
<td>ELEG 5491</td>
<td>Introduction to Deep Learning</td>
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</table>
Elective Courses:

15 units of courses:

(i) 12 units of ESTR courses of which at most 6 units of courses at 1000 or 2000 level and at least 6 units of courses at 3000 or 4000 level

(ii) 3 units of

BMEG/CENG/CSCI/ELEG/ENGG/IERG/MAEG/SEEM courses at 5000 level