Engineering Faculty Council
Faculty of Engineering and Applied Science

Motion EFC_2016_02
APPROVED

Motion: **To approve a new specialization in "Internet of Things" in the Software Engineering undergraduate program.**

Motion moved by: Hossam Kishawy

Seconded: Ramiro Liscano

In Favour: 28

Against: 1

Abstention: 1

The motion was approved.

UOIT
CHALLENGE INNOVATE CONNECT

FACULTY   OF   ENGINEERING AND   APPLIED   SCIENCE

Software   Engineering

Major   Program   Modifications: Specialization   in   Internet   of   Things

Department of Electrical, Computer and Software Engineering
October 2016

Prepared by:

Ramiro Liscano (ECSE Department Chair)

Shahryar Rahnamayan (Chair of the SE Program Curriculum Committee)

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Qusay Mahmoud (SE Faculty)

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Akramul Azim (SE Faculty)

Khalid Hafeez (SE Teaching Faculty)

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Ying Zhu (Member of the SE Program Curriculum Committee)

Nicholas Gregorio (Student Member in the EE Program Curriculum Committee)

The Internet of Things is a growing market with many IT and telecom companies investing and recruiting significantly in this area. To this end, the Software Engineering (SE) program is proposing to introduce a new specialization in "Internet of Things", which will be available to SE students going into their fourth year starting Fall 2017. The specialization consists of 12 credit hours with specialized courses in IoT, Data Mining, and Cloud Services. The proposed specialization fits within the Strategic Mandate Agreement regarding the Informatics area of strength and growth.

Executive Summary

1. **INTRODUCTION**

The specialization in Internet of Things (IoT) consists of 12 credit hours with specialized technical courses on design and analysis of IoT software systems, connecting IoT devices and services to the cloud, sensor data collection and analysis, and mobile programming. The specialization is proposed to focus on the 4th year.

Three of the courses in the new specialization have already been offered as Special Topic elective courses in prior years:

SOFE 4870U: Special Topics in SE "Data Mining"
SOFE 4870U: Special Topics in SE "Cloud Computing"
SOFE 4870U: Special Topics in SE "Mobile Computing"

To this end, one new course is proposed along with the conversion and slight modification of the special topic courses to required courses. The following is a list of the IoT courses:

1. SOFE 4610U Design and Analysis of IoT Software Systems
2. SOFE 4620U Machine Learning and Data Mining
3. SOFE 4630U Cloud Computing
4. SOFE 4640U Mobile Application Development

The 4 additional courses make up the specialization. While the two Capstone courses (ENGR 4940U and ENGR 4941U) are not specific to the IoT specialization, students will focus on IoT capstone projects.

The proposed changes to the SE program (Comprehensive) to include IoT specialization are:

- Replace Engineering Elective in 4-1 with: "SOFE 4610U Design and Analysis of IoT Software Systems",
- Replace SOFE 4850U User Interfaces in 4-1 with: "SOFE 4640U Mobile Application Development",
- Replace Engineering Elective in 4-2 with: "SOFE 4620U Machine Learning and Data Mining", Replace Engineering Electives in 4-3 with: "SOFE 4630U Cloud Computing".

2. **DEGREE REQUIREMENTS**

   a. **Program Learning Outcomes**

   Graduates of the IoT Specialization are expected to meet the abilities of the current software engineering program, while in addition gaining new knowledge and skills in the field of internet sensors, data storage and analysis, cloud services, and mobile computing:

1. Depth and breadth of knowledge
   - Describe and explain the basic principles of data sensing and communications, data storage, data analysis, data mining, mobile devices and services, and distributed cloud services.
   - Demonstrate knowledge of interconnected sensing and actuation through cloud services in the Internet as well as the storage and analysis of sensing data.
2. Knowledge of methodologies
   - To learn about different IoT architectural designs
   - To learn how connect with sensors and actuators through the Internet
   - To utilize knowledge and software tools to analyze data   To understand how to create "smart and connected" environments.
   - To learn about the management of IoT systems.
   - To learn about possible security threats, interoperability, communication and networking of IoT services.
3. Application of knowledge
   - Apply knowledge in the design of IoT services for applications of "smart" spaces.   Apply data analysis knowledge to find trends in sensor data.
4. Communication Skills
   - To discuss topics of IoT accurately and effectively, in both written and oral form, with members of academia as well as industry.
5. Awareness of limits of knowledge
   - Students will recognize the limitations of the current state of knowledge in IoT and appreciate the need to adapt new and emerging technologies in the field.
6. Autonomy and professional capacity
   - Students are expected to become an active member of a multidisciplinary and multicultural team and appreciate the importance of academic integrity, professional ethical conduct, and social responsibility.
   - Students will pursue further scholarly pursuits, employment, and community involvement to advance the knowledge base in smart interconnected systems and contribute towards the economic and societal growth of the community.

b. Admission requirements

All first year Engineering programs, including Software Engineering, share the same entrance requirements. The specific average or standing required for admission varies from year to year. Students are selected by taking into consideration a wide range of criteria including school marks, distribution of subjects taken, and performance in subjects relevant to the academic program. Possession of the minimum requirements does not guarantee acceptance. Preference will be given to applicants with the best qualifications. The minimum 1st year admission requirements include: current Ontario secondary school students must complete the Ontario Secondary School Diploma (OSSD) with six 4U or 4M

credits including English (ENG4U) with a minimum average of 60 per cent, Advanced Functions (MHF4U), Calculus and Vectors (MCV4U), Chemistry (SCH4U), and Physics (SPH4U). In addition, a combined minimum 70 per cent average in math and science courses is required, with no grade below 60 per cent. These are the minimum requirements, and admission is competitive.

No changes to the admission requirements will be made to accommodate the new proposed IoT specialization.

We hope to have 10 to 15 students in the Internet of Things (IoT) Specialization.

c.   Program structure

The current program map (2016/17) for the Software Engineering program is in Appendix I and the program map for the specialization in IoT is in Appendix II.

d.   Program content

Four new courses are being added. The program calendar copy is in Appendix III, and all the course templates for the new courses are listed in Appendix IV.

3.   RESOURCE REQUIREMENTS

a.   Faculty members

The following faculty members in the Department of Electrical, Computer and Software Engineering / FEAS are full-time and do research in the areas related to the IoT. All of them are supervising graduate students in related areas.

Dr. Ramiro Liscano, Associate Professor and ECSE Dept. Chair

Dr. Qusay Mahmoud, Professor

Dr. Masoud Makrehchi, Assistant Professor

Dr. Khalid Hafeez, Teaching Faculty

Dr. Akramul Azim, Assistant Professor

All related courses of the IoT will be taught by the above faculty members.

b.   Additional academic and non-academic human resources

The faculty is hiring a CRC Chair II in the area of the Internet of Things. This professor will be a key faculty member in both teaching the specialty courses, supervising capstone students, and performing research in this area.

One lab instructor is familiar with the use of Arduino's, sensors, and embedded devices that are leveraged in the labs in SOFE 4610U Design and Analysis of IoT Software Systems.

Graduate students working with the above professors have the expertise in the technologies and tools required for the development of IoT services and will be able to serve as Teaching Assistants for the core courses in this specialization.

c. **Physical resource requirements**

Most of the resources required for the new specialization already exist. Last year we invested $5,000 in Arduino kits and Rasberry PIs.

Existing lab space (ENG 2035) will be utilized for the SOFE 4610U Design and Analysis of IoT Software Systems course. In addition, a new experiential lab is being built in the new SIRC building that will be leveraged for these students.

All of the resources required for the new specialization already exist since most of the software tools are available for free or at a significant reduced educational cost.

The labs will be used to provide the experiential learning, and go through regular updates.

4. **BUSINESS PLAN**

a. **Statement of funding requirements**

There are four faculty members (plus a new CRC chair hire) in the Department of Electrical, Computer and Software Engineering, who are currently working in the area of IoT and they will be supporting the new specialization and teaching all the core courses. No additional faculty members are required to support this specialization at this point in time.
The specialization will be offered to students who will be in their 4th year in Fall 2017, to coincide with the CEAB accreditation visit for the Software Engineering program. However, some of courses in this specialization have already been offered as elective courses.

b. **Statements of resource availability**

The physical resources and faculty required for this new specialization already exist within the Department of Electrical, Computer and Software Engineering. Existing labs and lab equipment will be supporting this new specialization and any additional lab equipment is relatively low cost.

Engineering Curriculum Committee approval	October 26, 2016
Engineering Faculty Council approval	November 9, 2016
Date of Submission to CPRC	November 9, 2016

Appendix 1: Current Software Engineering Program Map

Software Engineering Program Map 2016-2017

Year	Course	Course	Course	Course	Course	Course
1-1	COMM 1050U Technical Communications	ENGR 1015U Introduction to Engineering	MATH 1010U Calculus I	MATH 1850U Linear Algebra for Engineers (Coreq: MATH 1010U)	PHY 1010U Physics I	
1-2	CHEM 1800U Chemistry for Engineers	SSCI 1470U Impact of Science and Technology on Society	ENGR 1200U Introduction to Programming for Engineers	MATH 1020U Calculus II (MATH 1010U)	PHY 1020U Physics II (PHY 1010U)	ENGR 1025U Engineering Design (ENGR 1015U)
2-1	ELEE 2110U Discrete Mathematics for Engineers (MATH 1020U, MATH 1850U)	ELEE 2790U Electric Circuits (MATH 1020U, PHY1020U, MATH 1850U)	SOFE 2710U Object Oriented Programming and Design (ENGR 1200U)	SOFE 2800U Web Programming (ENGR 1200U)	SOFE 2850U Natural Science Foundations for Information Technology (ENGR 1015U)	Liberal Studies Elective
2-2	SOFE 2715U Data Structures (SOFE2710U)	ELEE 2450U Digital Systems (ELEE 2110U)	SOFE 2720U Principles of Software and Requirements Engineering (SOFE 2710U, SOFE 2800U)	STAT 2800U Statistics and Probability for Engineers (MATH 1020U)	Science Elective	
3-1	ELEE 3450U Microprocessors and Computer Architecture (ELEE 2450U)	SOFE 3650U Software Design and Architectures (SOFE 2720U)	SOFE 3770U Design and Analysis of Algorithms (ELEE 2110U, SOFE 2715U, MATH 1850U)	SOFE 3200U Systems Programming (SOFE 2720U, Coreq: ELEE 3450U)	SOFE 3700U Data Management Systems (SOFE 2715U, SOFE 2720U Coreq: SOFE 3770U)	Liberal Studies Elective
3-2	ENGR 3360U Engineering Economics	SOFE 3490U Software Project Management (54 credit hours)	SOFE 3720U Introduction to Artificial Intelligence (SOFE 3650U, SOFE 3770U)	SOFE 3950U Operating Systems (SOFE 3200U, ELEE 3450U)	SOFE 3980U Software Quality (SOFE 3200U, SOFE 3650U, SOFE 3700U, SOFE 3770U)	SOFE 3850U Computer Networks (54 credit hours)
4-1	ENGR 4940U Capstone Systems Design for Electrical, Computer and Software Engineering I (Successful completion of all non-elective courses in year three)	SOFE 4790U Distributed Systems (SOFE 3770U, SOFE 3850U, SOFE 3950U)	SOFE 4850U User Interfaces (SOFE 3650U)	SOFE 4590U Embedded Systems (ELEE 3450U, SOFE 3950U)	Engineering Elective	
4-2	ENGR 4941U Capstone Systems Design for Electrical, Computer and Software Engineering (ENGR 4940U)	ENGR 4760U Ethics, Law and Professionalism for Engineers	SOFE 4840U Software and Computer Security (SOFE 3850U, SOFE 4790U)	Engineering Elective	Engineering Elective	

**Appendix II: Proposed New Program Map for the Software Engineering
Specialization in Internet of Things**

Software Engineering – Internet of Things Program Map 2017

Year	Course	Course	Course	Course	Course	Course
1-1	COMM 1050U Technical Communications	ENGR 1015U Introduction to Engineering	MATH 1010U Calculus I	MATH 1850U Linear Algebra for Engineers (Coreq: MATH 1010U)	PHY 1010U Physics I	
1-2	CHEM 1800U Chemistry for Engineers	SSCI 1470U Impact of Science and Technology on Society	ENGR 1200U Introduction to Programming for Engineers	MATH 1020U Calculus II (MATH 1010U)	PHY 1020U Physics II (PHY 1010U)	ENGR 1025U Engineering Design (ENGR 1015U)
2-1	ELEE 2110U Discrete Mathematics for Engineers (MATH 1020U, MATH 1850U)	ELEE 2790U Electric Circuits (MATH 1020U, PHY1020U, MATH 1850U)	SOFE 2710U Object Oriented Programming and Design (ENGR 1200U)	SOFE 2800U Web Programming (ENGR 1200U)	SOFE 2850U Natural Science Foundations for Information Technology (ENGR 1015U)	Liberal Studies Elective
2-2	SOFE 2715U Data Structures (SOFE 2710U)	ELEE 2450U Digital Systems (ELEE 2110U)	SOFE 2720U Principles of Software and Requirements Engineering (SOFE 2710U, SOFE 2800U)	STAT 2800U Statistics and Probability for Engineers (MATH 1020U)	Science Elective	
3-1	ELEE 3450U Microprocessors and Computer Architecture (ELEE 2450U)	SOFE 3650U Software Design and Architectures (SOFE 2720U)	SOFE 3770U Design and Analysis of Algorithms (ELEE 2110U, SOFE 2715U, MATH 1850U)	SOFE 3200U Systems Programming (SOFE 2720U, Coreq: ELEE 3450U)	SOFE 3700U Data Management Systems (SOFE 2715U, SOFE 2720U Coreq: SOFE 3770U)	Liberal Studies Elective
3-2	ENGR 3360U Engineering Economics	SOFE 3490U Software Project Management (54 credit hours)	SOFE 3720U Introduction to Artificial Intelligence (SOFE 3650U, SOFE 3770U)	SOFE 3950U Operating Systems (SOFE 3200U, ELEE 3450U)	SOFE 3980U Software Quality (SOFE 3200U, SOFE 3650U, SOFE 3700U, SOFE 3770U)	SOFE 3850U Computer Networks (54 credit hours)
4-1	ENGR 4940U Capstone Systems Design for Electrical, Computer and Software Engineering I (Successful completion of all non-elective courses in year three)	SOFE 4790U Distributed Systems (SOFE 3770U, SOFE 3850U, SOFE 3950U)	SOFE 4640U Mobile Application Development (SOFE 3950U)	SOFE 4590U Embedded Systems (ELEE 3450U, SOFE 3950U)	SOFE 4610U Design and Analysis of IoT Software Systems (SOFE 3850U, SOFE 3980U, Coreq: SOFE 4790U)	
4-2	ENGR 4941U Capstone Systems Design for Electrical, Computer and Software Engineering (ENGR 4940U)	ENGR 4760U Ethics, Law and Professionalism for Engineers	SOFE 4840U Software and Computer Security (SOFE 3850U, SOFE 4790U)	SOFE 4620U Machine Learning and Data Mining (SOFE 3720U)	SOFE 4630U Cloud Computing (SOFE 3850U, SOFE 4790U)	

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Appendix III: Calendar Copy

Changes for IoT specialization are in Year 4 only.

YEAR 4 Semester 1 (15 credit hours)
SOFE 4790U Distributed Systems
~~SOFE 4850U User Interfaces~~ SOFE 4640U Mobile Application Development
SOFE 4590U Embedded Systems
~~Engineering elective~~ SOFE 4610U Design and Analysis of IoT Software Systems
ENGR 4940U Capstone Systems Design for Electrical, Computer and Software Engineering I

Semester 2 (15 credit hours)
SOFE 4840U Software and Computer Security
ENGR 4760U Ethics, Law and Professionalism for Engineers
ENGR 4941U Capstone Systems Design for Electrical, Computer and Software Engineering II
~~Engineering elective~~ (SOFE 4620U Machine Learning and Data Mining)
~~Engineering elective~~ (SOFE 4630U Cloud Computing)

Appendix IV: Course Templates

NEW COURSE TEMPLATE

Faculty: Engineering and Applied Science	
Course title: Design and Analysis of IoT Software Systems	

Course number: SOFE 4610U	**Cross-listings:**	_X_ Core _____ Elective
Credit weight: 3 credit	**Contact hours:** _3_ Lecture 3 (Bi-weekly) Lab ___ Tutorial ___ Other	

CALENDAR DESCRIPTION

Internet of Things (IoT) systems are large scale complex systems integrating sensing, data analytics, software services, and actuation through the Internet. Design and development of software systems for the Internet of Things (IoT) and the related architectures, technologies, communication protocols and frameworks used to enable the IoT are described. The importance and benefits of IoT in society is presented through large scale IoT application examples like smart buildings, remote health monitoring, and smart cities. Students will learn to design and analyze IoT systems with an emphasis on software architecture, protocols at the sensor, actuation, and service layer, and data storage and analysis with the goal of facilitating the deployment of IoT services. IoT specific security concerns and solutions will be discussed. Experiential learning is emphasized through hands-on design and development of IoT prototypes.

Prerequisites	SOFE 3850U. SOFE 3980U
Co-requisites	SOFE 4790U
Credit restrictions	
Credit exemptions	
Grading scheme	X letter grade pass/fail

LEARNING OUTCOMES

1. Characterize the IoT and describe the main components used for the development of a software system for the IoT.

2. Understand the various protocols and frameworks used in the IoT.
3. Learn how design and test IoT systems.
4. Learn about the security threats in IoT
5. Design and build a IoT system prototypes.

DELIVERY MODE

(check all that may apply)	X face-to-face	hybrid	online

TEACHING AND ASSESSMENT METHODS

Course will be taught with a significant experiential component to it.

CONSULTATION AND FINANCIAL IMPLICATIONS, WHERE APPROPRIATE

APPROVAL DATES

Curriculum Committee approval:	Software Engineering Program Curriculum Committee: October 25, 2016

Department Council approval	October 19, 2016
Engineering Curriculum Committee approval	October 26, 2016
Engineering Faculty Council approval	November 9, 2016
Date of Submission to CPRC	November 9, 2016

AUs and GAs for SOFE 4610U: Design and Analysis of IoT Software Systems

<u>**AUs**</u>

Math	Basic Science	Complementary Studies	Engineering Science	Engineering Design
			50	50

<u>**GAs**</u>

KBE	PA	INV	DES	UET	ITW	COM	PRO	ISE	ETH	EPM	LLL
DA	A		A	DA			DA	ID			

NEW COURSE TEMPLATE

Faculty: Engineering and Applied Science			
Course title: Machine Learning and Data Mining			
Course number: SOFE 4620U	**Cross-listings:**	_X_ **Core**	_____ **Elective**
Credit weight:	**Contact hours:** _3_ Lecture ____ Lab ___ Tutorial ___ Other		

CALENDAR DESCRIPTION

This course is offered in two parts. First part covers the discovery of new knowledge using various data mining techniques on real-world datasets. Introducing the details of the current Algorithms in Data Mining and Machine Learning such as supervised and unsupervised learning, neural networks and deep learning, dimensionality reduction, and information theory is the fundamental context for this course. This course utilizes the latest blended learning techniques to explore topics in foundations of knowledge discovery and data mining; data mining approaches; and the application of data mining within such diverse domains as health care, business, supply chain and IT security. Current research directions, trends, issues and challenges are also explored. The second part will cover the applications of Machine Learning and Data mining in Internet of Things IoT) domain. Issues with the data extracted or collected from an IoT system are covered in two parts: 1) Mining time series data and 2) Introduction to streaming and real-time data mining.

Prerequisites	SOFE 3720U
Co-requisites	
Credit restrictions	
Credit exemptions	
Grading scheme	X letter grade pass/fail

LEARNING OUTCOMES

1. Data mining definitions and facts
2. Distance measures
3. Data mining pre-processing including feature selection
4. Learning methods: clustering, classification and semi-supervised learning
5. Deep learning and neural networks
6. Mining time series data
7. Introduction to streaming and real-time data mining
8. Evaluation methods
9. Complexities including class imbalance
10. Dark side of data mining: ethical issues, data privacy and security issues

DELIVERY MODE

(check all that may apply)	X face-to-face	hybrid	online

_____

8-A New Course Template   UOIT Quality Assurance Handbook **TEACHING AND ASSESSMENT METHODS**

Students will be assessed through significant data challenge assignments, surveys, class participation and final exam. Exposure to state of the art data mining tools is important.

CONSULTATION AND FINANCIAL IMPLICATIONS, WHERE APPROPRIATE

This course was taught in the Fall of 2016 as a special topics course.

APPROVAL DATES

Curriculum Committee approval	Software Engineering Program Curriculum Committee: October 25, 2016
Department Council approval	October 19, 2016
Engineering Curriculum Council approval	October 26, 2016
Engineering Faculty Council approval	November 9, 2016
Date of Submission to CPRC:	November 9, 2016

AUs and GAs for SOFE 4620U Machine Learning and Data Mining

<u>**AUs**</u>

Math	Basic Science	Complementary Studies	Engineering Science	Engineering Design
25			50	25

<u>**GAs**</u>

KBE	PA	INV	DES	UET	ITW	COM	PRO	ISE	ETH	EPM	LLL
ID	A		A	A							

NEW COURSE TEMPLATE

Faculty: FEAS		
Course title: Cloud Computing		
Course number: SOFE 4630U	**Cross-listings: N/A**	__√__ **Core** ____ **Elective**
Credit weight: 3	**Contact hours:** __3___ Lecture _____ Lab _____ Tutorial _____ Other	

CALENDAR DESCRIPTION

The objective of this course is to expose students to the state of the art in cloud computing. Students will learn about issues relevant to the design, implementation and operation of cloud computing infrastructures, platforms, and services for the Internet of Things (IoT). Topics include web services, description languages, communication protocols, data centers, virtualization, storage, big data, and cloud programming models, services and resource management, and security, privacy and trust issues. In addition, students will learn about systems research through a research and development project.

Prerequisites	**SOFE 4790U**
Co-requisites	
Credit restrictions	**None**
Credit exemptions	**None**
Grading scheme	**√ letter grade pass/fail**

LEARNING OUTCOMES

Students who successfully complete this course will have demonstrated an understanding of:

• Cloud computing principles and programming models

• State of the art in cloud computing tools and services

• Design, implementation and operation of cloud computing applications and services

• Applications of cloud computing to Internet of Things

• Security, privacy and trust issues in cloud computing

• Systems research through an R&D project

DELIVERY MODE

(check all that may apply)   √ face-to-face   hybrid   online

TEACHING AND ASSESSMENT METHODS

A wide range of methods may be used to assess students' understanding and attainment of learning outcomes, including: in-class discussions, quizzes, presentations, exams, programming and written assignments, and projects.

CONSULTATION AND FINANCIAL IMPLICATIONS, WHERE APPROPRIATE

Software Engineering (SE) students have taken CSCI 4100U Mobile Devices as an Engineering Elective course. The proposed course is being expanded in scope and tailored to SE students. In addition, as per the calendar description CSCI 4100U has an online delivery component which can be problematic for CEAB accreditation.

APPROVAL DATES

Curriculum Committee approval	Software Engineering Program Curriculum Committee: October 25, 2016
Department Council approval	October 19, 2016
Engineering Curriculum Council approval	October 26, 2016
Engineering Faculty Council approval	November 9, 2016
Date of Submission to CPRC:	November 9, 2016

AUs and GAs for SOFE 4630U: Cloud Computing

AUs

Math	Basic Science	Complementary Studies	Engineering Science	Engineering Design
			65	35

GAs

KBE	PA	INV	DES	UET	ITW	COM	PRO	ISE	ETH	EPM	LLL
IDA	DA	DA	DA	IA	IA	ID	I			I	ID

NEW COURSE TEMPLATE

Faculty: Faculty of Engineering and Applied Science (FEAS)		
Course title: Mobile Application Development		
Course number: SOFE 4640U	**Cross-listings: N/A**	__√__ Core ____ Elective
Credit weight: 3	**Contact hours:** __3___ Lecture _____ Lab _____ Tutorial _____ Other	

CALENDAR DESCRIPTION

The objective of this course is to expose students to the state of the art in mobile application development. Students will learn about mobile operating systems, wireless networks, communication protocols, native and cross-platform mobile application development, software architecture for mobile applications, mobile apps for the Internet of Things, performance evaluation and the mobile user experience, app stores, the full development and publishing lifecycle of mobile applications, and security/privacy/trust of mobile applications and services.

Prerequisites	**SOFE 3950U**
Co-requisites	
Credit restrictions	**CSCI 4100U**
Credit exemptions	**None**
Grading scheme	**√ letter grade pass/fail**

LEARNING OUTCOMES

Students who successfully complete this course will have demonstrated an understanding and working knowledge of:

- State of the art in wireless networks, mobile application development tools and services

- Mobile operating systems

- Native and cross-platform mobile application development

- Mobile application development and publishing lifecycle

- Mobile user experience

- Performance evaluation of mobile apps

- Security, privacy and trust of mobile applications

DELIVERY MODE

(check all that may apply)   √ face-to-face   hybrid   online

TEACHING AND ASSESSMENT METHODS

A wide range of methods may be used to assess students' understanding and attainment of learning outcomes, including: in-class discussions, quizzes, presentations, exams, programming and written assignments, and projects.

CONSULTATION AND FINANCIAL IMPLICATIONS, WHERE APPROPRIATE

Software Engineering (SE) students have taken CSCI 4100U: Mobile Devices as an Engineering Elective course. The proposed course is being expanded in scope and tailored to SE students. In addition, as per the calendar description CSCI 4100U has an online delivery component which can be problematic for CEAB accreditation.

APPROVAL DATES

Curriculum Committee approval	Software Engineering Program Curriculum Committee: October 25, 2016
Department Council approval	October 19, 2016
Engineering Curriculum Council approval	October 26, 2016
Engineering Faculty Council approval	November 9, 2016
Date of Submission to CPRC:	November 9, 2016

AUs and GAs for 4640U Mobile Application Development

AUs

Math	Basic Science	Complementary Studies	Engineering Science	Engineering Design
			75	25

GAs

KBE	PA	INV	DES	UET	ITW	COM	PRO	ISE	ETH	EPM	LLL
IDA			IDA	IDA	A		A				

Appendix V: CEAB AUs for Accreditation Purposes

AUs have been re-calculated to reflect the changes, and the results are shown in the table below.
Note: This calculation is based on a 12-week semester.

Total							
CEAB Minimums							

	M Au	NS Au	CS Au	ES Au	ED Au	ES+ED	Math+NS
1982.27	230.25	217.5	275.29	743.13	516.1	1268.23	447.75
1950.0	195.0	195.0	225.0	225.0	225.0	900.0	420.0