

Program Proposal for an Undergraduate Certificate

1. Name of the proposed undergraduate certificate.

Computing Applications

2. Name of the department(s) involved.

Computer Science

Electrical and Computer Engineering

Supply Chain and Information Systems

3. Name of contact person(s).

Dr. Shashi Gadia

Dr. Doug Jacobson

Dr. Kevin Scheibe

4. General description of the undergraduate certificate.

The certificate in Computing Application is a cross-disciplinary course of study in the Colleges of Liberal Arts and Sciences, Engineering, and Business. It is designed for undergraduates not already enrolled in majors in Computer Science, Software Engineering, or Computer Engineering who wish to enhance their degree and employment possibilities by adding expertise in computing applications. The certificate program focuses on teaching students the essential skills required to develop and use computing applications in their subject domains.

The certificate program is offered jointly among the three colleges and their respective departments housing the majors of computer science, computer engineering, software engineering, and management information systems. The program consists of 9 credit hours selected from the core and 12 credits hours in electives. Of the 12 credit hours as electives applied to the certificate, no more than 9 can come from a single department.

5. Need for the proposed undergraduate certificate.

Students graduating from a wide range of disciplines at ISU gain valuable domain specific knowledge but in order to be successful in today's workplace they may be expected to possess adequate levels of technical knowledge and skills with computers. The proposed certificate program encompassing the basic knowledge of programming languages and computer systems can help fill this gap and enhance the employment opportunities of our students. The certificate is not available to students in Computer Science, Software Engineering, or Computer Engineering, but is open to students in any other major at ISU who seek to enhance their knowledge and earn a credential indicating their ability to use, modify and, to a limited extent, develop computing applications within their area of specialization. This certificate supports Iowa State's goal to "Provide accessible residential and distance educational programs that build on Iowa State's strengths and excellence in science and technology integrated with design, business, education, arts, humanities, and social sciences."

6. Objectives of the proposed undergraduate certificate including the student learning outcomes and how the learning outcomes will be assessed.

- Provide opportunities for students to develop skills and understanding about issues concerning computing related to their disciplines
- Prepare students with the basic skills of computer programming
- Prepare students with domain oriented application development skills
- Guide students in interdisciplinary approach to application development

Learning Outcomes:

Upon completion of the Certificate in Computing Applications, students will be able to:

- Demonstrate understanding of key concepts of programming languages.
- Understand, interpret, and articulate major processes associated with their specific domain from a computing application perspective.
- Effectively communicate computing application goals via written, oral, visual, and electronic means.
- Demonstrate ability to work in interdisciplinary teams.
- Use, setup, configure, troubleshoot and maintain a contemporary operating system.

7. Relationship of the undergraduate certificate to other programs at Iowa State University.

There are no other programs at ISU that fill the need for the certificate as stated in Section 5 above.

8. Relationship of the undergraduate certificate to the strategic plans of the university, of the college, and of department or program.

This certificate program adheres to Iowa State University's 2010-2015 strategic plan by providing "accessible residential and distance educational programs that build on Iowa State's strengths and excellence in science and technology integrated with design, business, education, arts, humanities, and social sciences." It also fosters a university culture and work environment of individuals working together to achieve at the highest level of abilities. Lastly, it will help to "recruit, support, retain, and graduate a diverse group of outstanding undergraduates ... dedicated to making a difference in the world."

9. Comparison of the proposed undergraduate certificate with similar programs at other universities, including the Regent's universities.

There are no such programs at University of Iowa or University of Northern Iowa.

10. Program requirements and procedures, including:

- a. **Pre-requisites for prospective students;**

There are no required prerequisites for students to begin the certificate program. The program meets the university requirements for such programs.

- The certificate program must meet the minimum requirement of 21 credits.
- To augment the skills or literacy needed to successfully complete the certificate, a student may take courses listed in the literacy/background course section. These courses do not count towards the certificate.
- All pre-requisites will be enforced, but not all pre-reqs may count towards the certificate.
- Courses taken for the certificate may not be taken on a pass not-pass basis.
- At least 9 of the credits taken at Iowa State University must be in courses numbered 300 or above.
- A minimum of 9 credits used for the certificate may not be used to meet any other department, college, or university requirement for the baccalaureate degree except to satisfy the total credit requirement for graduation and to meet credit requirements in courses numbered 300 or above.
- A student may not receive both an undergraduate major and a certificate of the same name.
- For students earning an Iowa State University baccalaureate degree, a certificate is awarded concurrent with or after the Iowa State University baccalaureate degree.
- A certificate is not awarded until baccalaureate requirements are finished.
- After receiving a baccalaureate degree from any accredited institution, a student may enroll at Iowa State University to earn a certificate.
- A cumulative grade point average of at least 2.00 is required in courses taken at ISU for a certificate.
- A notation of completed certificate will be made on the transcript.

b. Application and selection process;

As per ISU rules, the certificate is available only to students pursuing a baccalaureate degree at ISU or students that currently hold a baccalaureate degree.

c. Language requirements;

None.

d. Courses and seminars presently available for credit toward the program;

Part I – Core. Programming language and operating systems concepts (9 credits, required of all students)¹

All Students will take:

COM S 252. Linux Operating System Essentials.

Students will complete 3 credits from one of the following

- COM S 107. Applied Computer Programming.
- COM S/MIS 207. Fundamentals of Computer Programming.
- COM S 227. Introduction to Object-oriented Programming.

Students will complete 3 credits from one of the following

- COM S 108X. Applied Computer Programming II.
- COM S 208. Intermediate Computer Programming.
- COM S 228. Introduction to Data Structures.

Core Course Descriptions

COM S 107. Applied Computer Programming. (3-0) Cr. 3. F.S. Introduction to computer programming for non-majors using a language such as the Visual Basic language. Basics of good programming and algorithm development. Graphical user interfaces.

COM S 108X. Applied Computer Programming II. (3-0) Cr. 3. F.S. Prereq: Com S 107 or equivalent. Advanced programming applications in Visual Basic for non-majors. Emphasis on programming projects including sorting, file processing, data processing, web programming, and graphics and animation. Students will learn problem-solving techniques and advanced programming skills to build real-world applications.

COM S/MIS 207. Fundamentals of Computer Programming. (Cross-listed with MIS). (3-1) Cr. 3. F.S. Prereq: MATH 150 or placement into MATH 140/MATH 141/MATH 142 or higher. An introduction to computer programming using an object-oriented programming language. Emphasis on the basics of good programming techniques and style. Extensive practice in designing, implementing, and debugging small programs. Use of abstract data types. Interactive and file I/O. Exceptions/error-handling. This course is not designed for computer science, software engineering, and computer engineering majors. Credit may not be applied toward graduation for both Com S 207/MIS 207 and Com S 227.

¹ Computer literacy/ background courses are also available but are not counted toward certificate, e.g. COM S 104, 105, and 201.

COM S 208. Intermediate Computer Programming. (3-1) Cr. 3. S. Prereq: MIS/COM S 207, credit or enrollment in MATH 151, MATH 160, or MATH 165. Intermediate-level programming techniques. Emphasis on designing, writing, testing, debugging, and documenting medium-sized programs. Data structures and their uses. Dynamic memory usage. Inheritance and polymorphism. Algorithm design and efficiency: recursion, searching, and sorting. Event-driven and GUI programming. The software development process. This course is not designed for computer science, software engineering and computer engineering majors. Credit may not be applied toward the major in computer science, software engineering, or computer engineering.

COM S 227. Introduction to Object-oriented Programming. (3-2) Cr. 4. F.S. An introduction to object-oriented design and programming techniques. Symbolic and numerical computation. Recursion and iteration. Modularity procedural and data abstraction, specifications and subtyping. Object-oriented techniques. Imperative programming. Emphasis on principles of programming and object-oriented design through extensive practice in design, writing, running, debugging, and reasoning about programs. This course is designed for majors. Credit may not be applied toward graduation for both Com S 207 and 227.

COM S 228. Introduction to Data Structures. (3-1) Cr. 3. F.S. Prereq: C- or better in 227, credit or enrollment in MATH 165. An object-oriented approach to data structures and algorithms. Object-oriented analysis, design, and programming, with emphasis on data abstraction, inheritance and subtype polymorphism. Abstract data type specification and correctness. Collections and associated algorithms, such as stacks, queues, lists, trees. Searching and sorting algorithms. Graphs. Data on secondary storage. Analysis of algorithms. Emphasis on object-oriented design, writing and documenting medium-sized programs. This course is designed for majors.

COM S 252. Linux Operating System Essentials. (2-2) Cr. 3. F. Prereq: COM S 107 or COM S 207 or COM S 227. Selected topics include: Linux Distributions, installation, configuration, and management of a Linux based computer system, shell programming, network accessing technologies, package management systems, system security, user, file sharing techniques, interoperation with other computers on the network, and open-source software. This is a hands-on course designed to demonstrate the installation and utilization of the Linux operating system for a personal computer.

Part II – Electives. Minimum of 12 credits, no more than 9 credits can be applied to the certificate from a single discipline. At least 9 credits must be 300 level or above.

Com S 363. Introduction to Database Management Systems.

CPR E 131. Introduction to Computer Security Literacy.

CPR E 185. Introduction to Computer Engineering and Problem Solving I.

CPR E 186. Introduction to Computer Engineering and Problem Solving II.

CPR E 281. Digital Logic.

CPR E 288. Embedded Systems I: Introduction.

CPR E 381. Computer Organization and Assembly Level Programming.

CPR E 388. Embedded Systems II: Mobile Platforms.

CPR E 444. Introduction to Bioinformatics.
CPR E 483. Hardware Software Integration.
CPR E 488. Embedded Systems Design.
CPR E 489. Computer Networking and Data Communications.
MIS 310. Information Systems Analysis.
MIS 320. Database Management Systems.
MIS 340. Project Management.
MIS 407. Advanced Business Programming.
MIS 436. Introduction to Business Analytics.
MIS 447. Information Systems Development.
MIS 440. Supply Chain Information Systems.
MIS 446. Advanced Business Analytics.
MIS 450 – Enterprise Resource Planning in Supply Chain Management.
C R P 451. Introduction to Geographic Information Systems.
C R P 452. Geographic Data Management and Planning Analysis.
C R P 551. Introduction to Geographic Information Systems.

Course Descriptions of Electives by Department

Computer Science:

Com S 363. Introduction to Database Management Systems. (3-0) Cr. 3. F.S. Prereq: COM S 228 with C- or better, ENGL 250. Relational, object-oriented, and semi structured data models and query languages. SQL, ODMG, and XML standards. Database design using entity-relationship model, data dependencies and object definition language. Application development in SQL-like languages and general purpose host languages with application program interfaces. Information integration using data warehouses, mediators and wrappers. Programming Projects. Non-major graduate credit.

Computer Engineering:

CPR E 131. Introduction to Computer Security Literacy.

(Cross-listed with INFAS). (1-0) Cr. 1.

Basic concepts of practical computer and Internet security: passwords, firewalls, antivirus software, malware, social networking, surfing the Internet, phishing, and wireless networks. This class is intended for students with little or no background in information technology or security. Basic knowledge of word processing required. Offered on a satisfactory-fail basis only.

CPR E 185. Introduction to Computer Engineering and Problem Solving I.

(2-2) Cr. 3. *Prereq: Credit or enrollment in MATH 141*

Introduction to Computer Engineering. Project based examples from computer engineering. Individual interactive skills for small and large groups. Computer-based projects. Solving

engineering problems and presenting solutions through technical reports. Solution of engineering problems using a programming language.

CPR E 186. Introduction to Computer Engineering and Problem Solving II.

(0-2) Cr. 1. S. *Prereq: CPR E 185*

Project based examples from computer engineering. Group skills needed to work effectively in teams. Group problem solving. Computer based projects. Technical reports and presentations. Students will work on 2 or 3 self-directed team based projects that are representative of problems faced by computer engineers.

CPR E 281. Digital Logic.

(3-2) Cr. 4. F.S. *Prereq: sophomore classification*

Number systems and representation. Boolean algebra and logic minimization. Combinational and sequential logic design. Arithmetic circuits and finite state machines. Use of programmable logic devices. Introduction to computer-aided schematic capture systems, simulation tools, and hardware description languages. Design of simple digital systems.

CPR E 288. Embedded Systems I: Introduction.

(3-2) Cr. 4. F.S. *Prereq: CPR E 281, COM S 207 or COM S 227*

Embedded C programming. Interrupt handling. Memory mapped I/O in the context of an application. Elementary embedded design flow/methodology. Timers, scheduling, resource allocation, optimization, state machine based controllers, real time constraints within the context of an application. Applications laboratory exercises with embedded devices.

CPR E 381. Computer Organization and Assembly Level Programming.

(3-2) Cr. 4. F.S. *Prereq: CPR E 288*

Introduction to computer organization, evaluating performance of computer systems, instruction set design. Assembly level programming: arithmetic operations, control flow instructions, procedure calls, stack management. Processor design. Datapath and control, scalar pipelines, introduction to memory and I/O systems.

CPR E 388. Embedded Systems II: Mobile Platforms.

(3-2) Cr. 4. *Prereq: CPR E 288*

Contemporary programming techniques for event driven systems - Xcode and COCOA for objective-C. Location and motion sensors based user interfaces. Threading and scheduling. Resource management - measurement and control techniques - for memory and energy. Client-server application design. Distributed applications. Laboratory includes exercises based on a mobile platform such as iPhone.

CPR E 444. Introduction to Bioinformatics.

(Cross-listed with BCB, BC BIO, COM S, BIOL, GEN). (4-0) Cr. 4. F. *Prereq: MATH 165 or STAT 401 or equivalent*

Broad overview of bioinformatics with a significant problem-solving component, including hands-on practice using computational tools to solve a variety of biological problems. Topics include: database searching, sequence alignment, gene prediction, RNA and protein structure prediction, construction of phylogenetic trees, comparative and functional genomics, systems biology. Nonmajor graduate credit.

CPR E 483. Hardware Software Integration.

(3-3) Cr. 4. S. *Prereq: CPR E 381*

Embedded system design using hardware description language (HDL) and field programmable gate array (FPGA). HDL modeling concepts and styles are introduced; focus on synthesizability, optimality, reusability and portability in hardware design description. Introduction to complex hardware cores for data buffering, data input/output interfacing, data processing. System design with HDL cores and implementation in FPGA. Laboratory-oriented design projects. Nonmajor graduate credit.

CPR E 488. Embedded Systems Design.

(3-3) Cr. 4. *Prereq: CPR E 381 or COM S 321*

Embedded microprocessors, embedded memory and I/O devices, component interfaces, embedded software, program development, basic compiler techniques, platform-based FPGA technology, hardware synthesis, design methodology, real-time operating system concepts, performance analysis and optimizations. Nonmajor graduate credit.

CPR E 489. Computer Networking and Data Communications.

(3-2) Cr. 4. F.S. *Prereq: CPR E 381 or E E 324*

Modern computer networking and data communications concepts. TCP/IP, OSI protocols, client server programming, data link protocols, local area networks, and routing protocols. Nonmajor graduate credit.

Management Information Systems:

MIS 407. Advanced Business Programming.

(3-0) Cr. 3. *Prereq: MIS 307*

Advanced software development and topics in contemporary programming languages. Topics include basic syntax, advanced programming techniques, file structures and management, database access, algorithm design, web forms and graphical user interfaces.

MIS 310. Information Systems Analysis.

(3-0) Cr. 3. *Prereq: MIS 301*

Critical analysis of business processes, data and process modeling, feasibility studies, CASE tools, and developing system design specifications. Nonmajor graduate credit.

MIS 320. Database Management Systems.

(3-0) Cr. 3. *Prereq: Credit or enrollment in MIS 307*

Database design, development, and implementation. Focus on data models, both classical and object oriented. Uses relational and/or object oriented database management systems.

Nonmajor graduate credit. Only one of MIS 423 and MIS 320 may count towards graduation.

MIS 340. Project Management.

(Cross-listed with SCM). (3-0) Cr. 3.

Equips students to support team activities in the general project management environment and better manage their careers. Practical experience using project management techniques and tools. Course topics include project initiation and execution, risk assessment, estimating and contracts, planning, human factors, and standard methods. Nonmajor graduate credit.

MIS 436. Introduction to Business Analytics. Cr. 3.

Prereq: STAT 226 and MIS 320 or permission from the instructor. This course provides an introduction to the field of business analytics (BA). It is designed to help students examine BA processes and techniques used in transforming data to knowledge and creating value for organizations. The class consists of business cases, presentations by business professionals, class lectures and discussions on data analysis, design and modeling, and extensive hands-on analytical exercises. Nonmajor graduate credit.

MIS 447. Information Systems Development.

(3-0) Cr. 3. *Prereq: MIS 310, MIS 320, credit or enrollment in MIS 435*

Design of business systems using contemporary tools and methods such as SQL, CASE tools, OOD tools, etc. Focuses on synthesizing concepts from earlier MIS courses. Nonmajor graduate credit.

MIS 440. Supply Chain Information Systems.

(Cross-listed with SCM). (3-0) Cr. 3. *Prereq: MIS 301, SCM 301*

Internal and inter-organizational information systems necessary for a supply chain to achieve competitive advantage. Topics include: design, development, implementation, and maintenance of supply chain information systems; enterprise resource planning; advanced planning and scheduling, manufacturing execution systems; and the interface between manufacturing planning and control processes, logistics processes, and the information system.

MIS 446. Advanced Business Analytics. (3-0) Cr. 3. Prereq: MIS 436X.

Projects-based course providing an in-depth understanding of BA methods of visualization, data mining, text mining, web mining, and predictions through the use of specific BA tools. Advanced techniques and applications of data analytics and acquiring hands on skills for making intelligent business decisions in data rich organizations.

MIS 450 – Enterprise Resource Planning in Supply Chain Management. Cr. 3. Prereq: SCM 301, MIS 301 or I E 148, I E 341.

The role of enterprise resource planning systems (ERP) in the supply chain. Hands-on experience with a major software application in use by many corporations to manage and improve the efficiency of their supply chains and operations. Students will develop a more process-centric perspective about how a supply chain operates and how ERP enables and supports such operations. Nonmajor graduate credit.

Community and Regional Planning:

C R P 451. Introduction to Geographic Information Systems. (2-2) Cr. 3. F.S.SS.

Introduction to geographic information systems, including discussions of GIS hardware, software, data structures, data acquisition, data conversion, data presentation, analytical techniques, and implementation procedures. Laboratory emphasizes practical applications and uses of GIS.

C R P 452. Geographic Data Management and Planning Analysis. (Dual-listed with C R P 552). (2-2) Cr. 3. F.S. Prereq: C R P 451 or equivalent. Extensive coverage of geo-relational database concept and design, GIS database creation and maintenance, geographic data manipulation and analysis. GIS output generation and geographic data presentation. Laboratory emphasizes practical applications and uses of GIS.

C R P 551. Introduction to Geographic Information Systems. (2-2) Cr. 3. F.S.SS.

Introduction to geographic information systems, including discussions of GIS hardware, software, data structures, data acquisition, data conversion, data presentation, analytical techniques, and implementation procedures. Laboratory emphasizes practical applications and uses of GIS.

Courses from various programs that are appropriate for the certificate will be added from time to time.

e. Proposed new courses or modifications of existing courses;

None.

f. advising of certificate students;

Each of the three departments will designate one or more advisors to advise students.

Advisors in each college will handle advising.

- g. implications for related areas within the university.

Each of the related majors will likely see increases in enrollment in select courses. If enrollments are small, there may be space in existing classes to accommodate the students. Larger enrollments may require additional sections of classes to be added.

11. General description of the resources currently available and future resource needs, in terms of:

- a. faculty members;

Computer Science: Pavan Aduri, Steve Kautz, James Lathrop, Guang Song, Xiaqiu Huang, Simanta Mitra, Shashi K Gadia. .

Computer Engineering: Tom Daniels, Joe Zamberno, Philip Jones, Yong Gua, Chris Chu.

Supply Chain and Information Systems: Dr. Joey George, Dr. Dengpan Liu, Dr. Zhengrui Jiang, Dr. Brian Mennecke, Dr. Sree Nilakanta, Dr. Kevin Scheibe, Dr. Anthony Townsend, Dr. Dan Zhu

- b. computers, laboratories, and other facilities;

Existing computer resources are sufficient for this program.

- c. library facilities (journals, documents, etc.) in the proposed area;

No new resources needed.

- d. supplies, field work, student recruitment, etc.

No new resources needed.

12. Describe the needs for new resources and/or reallocated resources. Attach to the program proposal memos from the department chair(s), the college dean(s), and other appropriate persons, agreeing to the allocation of new resources and/or the reallocation of resources.

No new resources and no new facilities such as lab spaces are currently proposed. If the number of students enrolling in the classes each semester is small, there may be space in existing classes to accommodate the students. Larger enrollments may require additional sections of classes to be added, especially in the Management Information Systems area where many sections of classes are currently at or near capacity. If demand exceeds capacity, the College of Business is prepared to open additional sections as needed.

13. Attach to the program proposal, letters of support, recommendations, and statements when appropriate, from programs and departments at ISU which are associated with the proposed program or have an interest in the proposed program.

See letters from chairs of the participating departments.

14. If the new program is interdisciplinary, a governance document should be created and submitted to the Associate Provost for Academic Programs. Indicate here that it has been completed.

It is included as an addendum in this document.

Governance Document
Computing Applications Certificate Program
Adopted May 6, 2014

The College of Liberal Arts and Sciences will serve as the Administering College for the certificate program. A Steering Committee for the certificate program in Computing Applications will consist of six individuals appointed to three-year overlapping terms by the Chairs of Computer Science; EE and Cpr E; and Supply Chain Management and Information Systems. The chair of the committee will be elected by the steering committee. The members will be as follows.

- a) Two faculty member from the College of Liberal Arts and Sciences.
 - a. Member one appointed for a 3 year term to start
 - b. Member two appointed for a 2 year term to start
- b) Two faculty member from the College of Engineering.
 - a. Member one appointed for 1 year term to start
 - b. Member two appointed for a 3 year term to start
- c) Two faculty member from the College of Business.
 - a. Member one appointed for a 2 year term to start
 - b. Member two appointed for a 1 year term to start

The responsibilities of the Steering Committee include:

- initiating the process for approval of all changes to the certificate program
- oversee substitutions for courses required to complete the certificate program
- develop and produce information sheets and publications related to the certificate program
- work directly with advisers in individual departments and programs to promote the certificate program
- work with faculty and staff across campus to promote educational activities with a computing applications focus
- be available to advise individual students pursuing the certificate program in their college
- update the catalog to reflect changes to the certificate program and its requirements
- provide information about the program to the colleges upon request

This Governance Statement may be amended by a two-thirds majority vote of the Steering Committee. University governance and academic policy have the final say in the event of any conflict between this governance document and the requirements of the program.

Academic Program Approval Voting Record

This document is to be appended as the last page of the proposal for any new or revised academic program to record the successive votes of approval as the proposal moves through its required review and approval steps. Consult Faculty Handbook Section 10.8 or the Faculty Senate Curriculum Committee website for information regarding Committee review and voting requirements for each action.

Curricular Action: (check appropriate boxes below)

1. New Program Name Change Discontinuation Concurrent Degree for:
2. Undergraduate Major Graduate Major Undergraduate Minor Graduate Minor
 Undergraduate Certificate Graduate Certificate Other: _____
3. Name of Proposed Change: Computing Applications Certificate _____
4. Name of Contact Person: Shashi K Gadia e-mail address: gadia@iastate.edu
5. Primary College: LAS Secondary College: Eng, Business
6. Involved Department(s): Computer Science EE & Computer Engineering
MIS and Supply Chain Management

Voting record for this curricular action:

Voting Body	Votes			Date of Vote
	For	Against	Abstain	
Dept of Computer Science	21	0	0	Nov 12, 2013
LAS Curriculum Committee	7	0	0	May 2, 2014
LAS Representative Assembly	20	0	0	May 7, 2014
ECpE Curr committee	8	0	0	Sep 19, 2013
ECpE Department faculty	31	0	0	Dec 6, 20`3
College of Eng CC	8	0	0	Feb 4, 2014
College of Eng faculty	159	9	8	May 15, 2014
College of Business CC	5	0	0	April 11, 2014
College of Business Faculty	43	0	*	May 12, 2014
Graduate Council				Not applicable
Faculty Senate Curriculum Committee				
Faculty Senate Academic Affairs Council				
Faculty Senate				

* The vote was taken electronically; everybody was provided opportunity to participate; 43 responded
[FSCC – November 2013]

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

College of Liberal Arts and Sciences
Department of Computer Science
226 Atanasoff Hall
515 294-4377
FAX 515-294-0258
Internet: www.cs.iastate.edu

November 14, 2013

To Whom it may Concern:

The Computer Science department is enthusiastic in its support for the Computing Applications certificate program, to be jointly offered with the College of Business and the Department of Electrical & Computer Engineering. Our faculty unanimously voted (25/25), to approve the certificate program in our November 12 faculty meeting.

Sincerely,

A handwritten signature in black ink, appearing to read "Johnny Wong". The signature is stylized and cursive, with the first name "Johnny" and the last name "Wong" clearly visible.

Johnny Wong
Professor and Chair
wong@iastate.edu

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

College of Engineering
Department of Electrical
and Computer Engineering
2215 Coover Hall
Ames, Iowa 50011-3060
515 294-2663
FAX 515 294-3637

October 21, 2014

Computer Coordination Committee
Iowa State University
Ames, IA 50011

To whom it may concern:

The faculty of the Department of Electrical and Computer Engineering (ECpE) met on December 6, 2013, and voted to support the Undergraduate Certificate in Computing Applications, jointly offered by the ECpE department, the Department of Computer Science, and the College of Business. Of 56 eligible voting members, quorum was met, and the vote was unanimously positive (30 yes, 0 no, and 0 abstain).

Sincerely,



David C. Jiles
Anson Marston Distinguished Professor
Palmer Endowed Department Chair
Department of Electrical and Computer Engineering
(515) 294-1097
dcjiles@iastate.edu

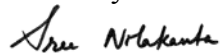
December 9, 2013

To:
Chair
Computer Coordination Committee
Subject: Certificate in Computing Applications

The certificate proposal was supported by the faculty by a vote of 13 in favor and three abstention. Two did not vote. I have also reviewed the proposal for the Undergraduate Certificate in Computing Applications and I support the proposed program.

Thank you

Sincerely



Sree Nilakanta
Chair