Please submit the typed original with all required signatures to the Graduate Council
Course syllabus must be attached and completed according to Fitchburg State guidelines

Form functionality most compatible using Adobe Acrobat 9 and newer.

Course Title: Advanced Programming

Banner Abbreviation:

A	D	V	A	N	C	E	D		P	R	O	G	R	A	M	M	I	N	G									

Banner limit of 30 characters, including punctuation, spaces, and special characters.

Faculty member(s) who are creating the course: Natasha Kourtonina, Brady Chen

Contact Person: Brady Chen

Graduate Program Proposing Change: Computer Science

Course Description:

This course covers the most essential concepts of modern Computer Programming with Python, Java and C programming languages. It starts with core computer science topics typically found in an undergraduate Computer Science curriculum, but at a graduate-level pace. Python programming language will be used as a tool for implementing advanced programming techniques and algorithms. Object Oriented Paradigm will be presented with Java. Finally, dynamic memory management, pointers and dynamic structures will be explored in C.

This course provides a solid background for further graduate level software classes.

Rationale for Offering the Course:

Depending on the background, all applicants admitted into either the regular or online computer science MS program may be required to complete undergraduate prerequisite courses in the order of CSC1500, CSC1550, and CSC2560. While these prerequisite courses provide the training for those students who lack the computer programming skills, it takes three consecutive semesters to complete them.

This graduate course provides an alternative for these undergraduate prerequisites. It covers all the necessary materials for the students to continue with the other courses in the program. The aim is to allow the students to complete the program faster and still maintain the quality of the program.

Is there a similar undergraduate course? ○ Yes ⦿ No   If so, how does this graduate course differ?

Discipline Prefix: CSC

If more than one provide rationale:

Credits: 3

Level: ⦿ 7000   ○ 8000   ○ 9000

Brief rationale for level choice:

Additional Requirements: Laboratory Hours: _____   Pre-Practicum Hours: _____   Practicum Hours: _____

Fieldwork Hours: _____   Other (specify): _____

Prerequisite course(s) if any: _____

This course will be: ☐ a Required Course   ☑ an Elective   Special/Note: _____

Course is a replacement for (Course Number/Name): _____

Has the course been offered previously as a "Topics" course? ⦿ Yes ○ No

If yes, How often? once, Fall 2020

What is the Expected Average Enrollment?: 15

Which semester will this course first be offered?: Spring 2020   How often thereafter to be offered?: Every semester

Does this course affect offerings in any other department or program? ○ Yes ⦿ No   If yes, please explain.

Is this an Extended Campus course? ○ Yes ⦿ No

FITCHBURG STATE UNIVERSITY

GRADUATE COUNCIL
NEW COURSE PROPOSAL

Course syllabus must be attached and completed according to Fitchburg State guidelines.

☒   Course Syllabus is Attached

[Print Form]

☑   Reviewed by Dean: _____

Required Signatures—Graduate and Continuing Education New Course Approval

Course Developer:_____Date:__10/27/2020__

Department Chair:_____Date:__10/23/2020__

Graduate Council Chair: _____Date:_____
(Indicates Graduate Council approval)

President:_____Date:_____

Syllabus

CSC 7131 Advanced Programming

Course Description

This course covers the most essential concepts of modern Computer Programming with Python, Java and C programming languages. It starts with core computer science topics typically found in an undergraduate Computer Science curriculum, but at a graduate-level pace. Python programming language will be used as a tool for implementing advanced programming techniques and algorithms. Object Oriented Paradigm will be presented with Java. Finally, dynamic memory management, pointers and dynamic structures will be explored in C.

This course provides a solid background for further graduate level software classes.

Textbooks

Think Python: How to Think Like a Computer Scientist 2nd Edition
by Allen B. Downey
ISBN-13: 978-1491939369
ISBN-10: 1491939362

Java : The Complete Reference, 10Th Edition by Herbert Schildt
ISBN-13: 978-9387432291
ISBN-10: 9789387432291

C Programming Language, 2nd Edition
by Brian W. Kernighan and Dennis M. Ritchie
ISBN: 01311036

Major Topics Covered in the Course

1. Programming paradigms. Introduction to fundamentals of computer programming in Python.
2. The concept of data types. Variables, assignments, operators and expressions in Python. Control statements and basic algorithms
3. String manipulations in Python: subscript operator, indexing, slicing a string, converting strings to numbers and vice versa. Strings and text files: manipulating files and directories.
4. Lists, tuples, and dictionaries. Basic searching and sorting techniques.
5. Structured programming and functions in Python. Algorithms and recursive functions.
6. Graphics and Image Processing in Python: "turtle" module, 2d drawing and image processing.
7. Fundamentals of Object Oriented Programming. Introduction to Java programming language.

8. Encapsulation, objects and classes in Java. Principles of Object oriented design.
9. Creating and Destroying objects in Java. Constructors and Garbage Collections.
10. Methods and classes in Java.
11. Inheritance and Polymorphism. Designing an Interface.
12. GUI and Event-driven programming in Java.
13. Threads, Processes and Multitasking in Java.
14. An Overview and history of C programming Language
15. Pointers, dynamic memory allocation, reference and dereference, malloc and calloc functions.
16. Arrays and Pointer Arithmetic in C.
17. Functions in C. Pointers as arguments and return types. Passing parameters by value and by reference.
18. Fundamental Linked List Algorithms in C: sorting, searching, deleting and adding nodes.
19. Representing Trees and various Graphs in C.
20. C and Fundamentals of Systems Programming. Programming UNIX processors.

Grading Policy

Graded assignments   50%
Exams   50%

I will calculate the final grades as follows:

FSU Grade	Letter grade Equivalency	100 Point Equivalency
4.0	A	95-100
3.7	A-	92-94
3.5	A-/B+	89-91
3.3	B+	86-88
3.0	B	83-85
2.7	B-	80-82
2.5	B-/C+	77-79
2.3	C+	74-76
2.0	C	71-73
0.0	F	0-70
W	Withdraw	65-66
IN	Incomplete	
IP	In-Progress	

How to get help in case your homework program does not run or you don't understand some essentials covered during the class?

Please contact your professor at any time via e-mail, visit him/her during my office hours or make an appointment for some other time.
Late submission and Acknowledgements

1. If you submit your assignment one day late, 10% of your grade will be deducted. After that you have one week to submit your assignment, but 40% of your grade will be deducted. No assignments are accepted after one week after the deadline!
2. If somebody helped you with your homework, you have to mention his/her name in the introductory comments for your projects.

Attendance Policy

Attendance is required. In case of extensive absence, a student will be given extra assignment and extra exam covering the topics that he/she missed.

Academic Integrity Policy

Every member of the university community is expected to maintain the highest standards of academic integrity. A student shall not submit work that is falsified or is not the result of the student's own effort. A student who is in doubt regarding standards of academic integrity in a course or assignment should consult the faculty member responsible for that course or assignment before submitting the work. A student's lack of understanding of the academic integrity policy is not a valid defense to a charge of academic dishonesty.

A student's name on any written or creative exercise (e.g., examination, report, thesis, theme, laboratory report, computer program, artistic production, etc.), or in association with an oral presentation, declares that the work is the result of that student's own thought and study. Any work that the student declares as their own shall be stated in the student's own words and produced without the assistance of others. Students must make clear through accurate citations when they make use of other sources. Talking during an examination, or possession or use of unauthorized materials or equipment during an examination constitutes an infringement of the academic integrity policy. Aiding and abetting academic dishonesty also constitutes a violation of the academic integrity policy.

Unless permission is received in advance from the faculty member in charge of the course involved, a student may not submit, in identical or similar form, work for one course that has been used to fulfill any academic requirement in another course at Fitchburg State University or any other institution. A student who perceives the possibility of overlapping assignments in courses should consult with the appropriate faculty members before presuming that a single effort will fulfill requirements of both courses. Students should consult course syllabi for additional guidance on matters of academic integrity.

Learning Disabilities.

Every attempt will be made to accommodate students with documented disabilities provided accommodation must be requested before the 2nd class meeting.