FITCHBURG STATE UNIVERSITY

These top fields will be completed by the SGOCE office.

Academic Year: * 2024-2025 SGOCE#: * 6

New Graduate Course Proposal

Form Procedure
To share the form with others prior to Submitting choose the **Save Progress** option at the bottom.
Create a PDF of the saved form go to Print and choose Save as PDF copy rather than print.
To access the saved form for editing or to finalize submission visit forms.fitchburgstate.edu to log in and view your Pending/Drafts under My Forms.

Course Title

Course Title: * Advanced Database Management

Proposed Banner Abbreviation: * Adv Database Mgmt

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

Department/Committee Information

The main contact person for the Graduate Curriculum Committee should fill out this form.

Requestor Name: * Xuzhou Chen

Members of the Graduate Curriculum Committee: Brady Chen, Guy Karlebach, Natasha Kurtonina, Nadimpalli Mahadev, Hefei Qiu, Ricky Sethi

Department / Unit Developing: * Computer Science

Department Chair: * Dr. Nadimpalli Mahadev * nmahadev@fitchburgstate.edu

Academic Dean: Dr. Jannette McMenamy jmcmenamy@fitchburgstate.edu

Program Chair: The Program Chair for this request is among the people listed above.
* (•) Yes
( ) No

Graduate Program: * MS CS

The above program would be responsible for scheduling, staffing & assessing this course.

Course Information

Course Description

* This course will cover a variety of topics in advanced database management including object-oriented Databases, object relational Databases, NoSQL databases, transactions and query processing. Topics include RDBMS Architecture, Object-Relational Data model, Query Optimization, NoSQL Databases, and ColumnStore Databases.

Course Objectives

Rationale and expected outcomes of offering the Course

* This course has been offered twice as a topics course and was received very positive feedbacks. It provides advanced topics in the database managements including the fundamentals of the object-oriented and object-relational models, NOSQL databases, and ColumnStore Databases. Upon successful completion of this course, students will:
- understand the basic concept of the fundamentals of the object-oriented and object-relational models.
- have the knowledge of NOSQL databases
• Understand how to critically evaluate a research paper in the discipline and how to discuss the paper

What are the Learning Outcomes for the Course?

Number of Credits: * 3

Discipline Prefix or Prefixes: * CSC

Brief rationale if more than one prefix:

Level of Course: * 7000 / 8000 / 9000 (8000 selected)

Brief rationale for level choice:: * This is the advanced topics in database management

The course will be: Requirement / Elective (Elective selected)

Elective or Requirement Note/Special:

Is there a similar undergraduate course? * Yes / No (No selected)

Does this course affect offerings in any other department or program? * Yes / No (No selected)

Course Enollment

Expected Average Enrollment: * 20

This course is a replacement for: Course # / Name

Has the course been offered previously as a "Topics" course? * Yes / No (Yes selected)

How often / when was it offered as a Topics course? 2 times

Is this an Extended Campus Course? * Yes / No (No selected)

Which semester will this course be offered for the first time?: * Summer 2025

How often thereafter to be offered?: * Every year

Course Requirements

Prerequisite course(s) if any: None

Additional Requirements

Laboratory Hours:

Fieldwork Hours:

Pre-Practicum Hours:

Practicum Hours:

Other Requirements (specify):

Syllabus Upload

New Course Syllabus Upload: syllabus CSC8060.pdf

Signatures

*Click on the **Submit Form** button at the bottom of the page after you have signed the form.*
You should receive an email confirmation that your signature has been completed.

...3035363134
Xuzhou Chen — 11/26/2024
Requester Signature — Date

...3338343138
Jannette McMenamy — 11/26/2024
Academic Dean Signature — Date

...3639373638
Nadimpalli Mahadev — 11/26/2024
Department Chair Approval — Date

...3837333532
Becky Cooper Gleng — 11/26/2024
SGOCE Dean Signature — Date

Graduate Council
The Graduate Council Chair Signature indicates that the Council has discussed this proposal and has decided it should move forward.

Graduate Council Chair Signature — Date

Notifications

Approval of the President	Date	SGOCE Dean Initials	Date
		Reviewed by the Registrar:	Date

Fitchburg State University
Graduate and Continuing Studies
CS8060 Advanced Database Management

Instructor: John Russo
Cell: (617) 960-8622
Email: jrusso440@gmail.com or jrusso1@fitchburgstate.edu
Slack: You should have been sent an invitation to the course's Slack channel. Please make sure to join this.

Office Hours: By appointment.
I will also make every effort to respond to email and voicemail as quickly as possible.

Text: There is no textbook for this course

Software: You can use a relational database management system of your choice.
You will be given an account with Amazon Web Services for some project work.

Course Description: This course will cover a variety of topics in advanced database management including object-oriented Databases, object-relational Databases, NoSQL databases, transactions and query processing.

Course Outcomes: The three objectives of this course are the following:

- Discuss the fundamentals of the object-oriented and object-relational models.
- Discuss NOSQL databases
- Understand how to critically evaluate a research paper in the discipline and how to discuss the paper

Teaching Modality: This course will be offered completely online. You will be provided with material each week on Blackboard. This will include lectures and reading material.
Each week, there will be discussion questions posted based on course materials as well as papers read.

Class Participation Students are expected to interact within the discussion board each week.

The Online Course Week All weeks will begin on Monday and end on Sunday evening.

Individual Discussions/ Online Participation (25%, 5% per week)

Each week has a page that includes "Discussion Topics". These are a series of questions or points to consider regarding the course materials posted that week, solutions to exercises related to the material and feedback on other learning group's solutions.
To earn full credit for the Participation component of the grade, students will be expected to complete the following during the course:

1. Respond to 1 or 2 Discussion Topics each week; respond to the topic by end of day Thursday (midnight EST). Some weeks, the discussion topic(s) will be on an issue or a review of a paper. For this type of discussion topic, the response should consist of approximately 200-250 words and include your own insights into the topic. Any relevant sources used within the post should be cited appropriately. Other weeks, you will be asked to present your solutions to a set of problems.

2. Post (at least) 2 other substantive messages to the Discussions each week by end of day Sunday (midnight EST) each week. If that week's discussion topic was a set of problems, your post should be a critique of one of your classmates' solution. If the discussion topic was a paper review or general discussion question, your response should be a reaction to the posting of a classmate or a request for additional clarification. The assumption is that you will read through the posts of your classmates to enhance your learning; respond to those of your choice, based upon your own experiences and insights.

Keep in mind that these postings to the Discussions bulletin board will be as rich as we make them; not having a traditional classroom in which to discuss topics, we can have some interesting discussions and share our experiences during the course. They are required to encourage you to share your knowledge and ideas while gaining from the experiences of your peers as well.

Evaluation:

Each week, discussion question(s) are provided. Students are required to post an original response by Thursday and two substantive replies to the posts of others required by Saturday. 20 raw points may be earned each week:

Maximum raw points earned for on-time original response: 12 points each.

- For discussion topics on an issue or review of a paper:
  - Answers all questions asked: 4 points
  - Includes shared industry experiences and/or relates concepts to the topic notes and readings as appropriate: 4 points

- Grammar/format/sources noted as appropriate: 2 points
- Sufficient detail; original responses are requested to be 200-250 words. 2 points

- For solutions to problem sets:
  - Solutions provided for all problems: 10 points
  - Formatting/presentation: 2 point

- 2 points will be deducted for an original response that is 1 day late; 0 points earned for original responses more than 1 day late.
- Please note that a score of 0 points will be awarded for any posts that do not appear to be original.

Maximum raw points earned for each on-time substantive response:4 points each.

- For discussion topics on an issue or review of a paper:
  - Substantive (beyond an "I agree" post) with follow-on points or questions to extend the conversation: 2 points
  - Grammar/format/sources noted as appropriate: 2 points
- For solutions to problem sets:
  - Substantive review of other student's solution with follow-on questions: 4 point

0 points earned for late substantive replies

Quizzes: There will be quizzes most weeks posted on Blackboard

Grading Criteria:

Projects	45%
Discussions	25%
Quizzes	30%

Projects: There will be two projects during the semester. Students can either work on these individually or in a team of 2.

Submission of Work: All projects and quizzes are due on Sunday evening by 11:59 PM.

Course Outline

Week Number	Dates	Topic	Readings/Assignments
1	5/22-5/28	Course Introduction RDBMS Architecture	1. Anatomy of a database system 2. Operating Systems Support for DBMS 3. Database Architecture Evolution: Mammals Flourished long before Dinosaurs became Extinct. 4. What Goes Around Comes Around (Optional)
2	5/29-6/4	Object-Relational Data model	1. ORDB Overview [Ramakrishnan's DB textbook]. 2. RDB versus OO versus OR. 3. Implementing OO Features in a DBMS. ***Project 1 Assigned***
3	6/5-6/11	Query Optimization	1. Overview of Query Optimization 2. Automated Selection of Materialized Views and Indexes for SQL Databases
4	6/12-6/18	NoSQL Databases	1. Dynamo: Amazon's Highly Available Key-value Store 2. Eventual Consistency Today: Limitations, Extensions, and Beyond ***Project 1 Due*** ***Project 2 Assigned***

5	6/19-6/25	ColumnStore Databases	1. C-Store: A Column-oriented DBMS 2. Comparison of Approaches to Large-Scale Data Analysis. 3. Integrating Compression and Execution in Column-Oriented Database Systems Project 2 Due