Course Description
Advanced object-oriented software development with an emphasis on the use of the unified modeling language as a design tool. Prerequisite: CSC 1254 or CSC 1351.

Course Objectives
- Describe, compare and contrast common principles for OO analysis and quality design
- Describe the characteristics of quality software systems
- Describe the relative advantages and disadvantages among several major process models
- Apply fundamental principles of Object Oriented (OO) programming
- Formulate models of a design plan by utilizing the Unified Modeling Language (UML)
- Classify common patterns in OO design
- Create a solution using an appropriately selected design pattern
- Apply communication skills necessary to work in a collaborative environment on a team-based project
- Apply skills in technical writing
- Apply communication skills necessary to participate in an oral presentation and project demonstration

Course Layout
- **Course Lectures:** The class will be FULLY IN-PERSON. Lecture attendance is required.
- **Homework Assignments:** Homework assignments will be made available in Moodle. These are to be completed and uploaded to Moodle, as instructed. All UML assignments must be implemented using Enterprise Architect, unless otherwise specified.
- **Class Project:** Students will work together in a collaborative environment to tackle a complex problem within the problem domain posed by the instructor. Students are expected to work together, divvy up responsibilities, and share resources in the implementation of the project. Every student is expected to do their fair share of work on the project. A student’s project grade will be proportionally adjusted based on level of effort expended on the project. A student cannot successfully complete this course without substantive contribution to the team project.
- **Exams:** There will be one, 1 hour and 20 minute, midterm exam and a two hour final exam. Arrangements for a make-up test must be made prior to the test. The instructor will be following LSU policy PS-22 with regards to valid reasons for missing an exam.
Evaluation
Grading will be based on in-class quizzes, homework assignments, class attendance, the class project, and two exams:

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Component</th>
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<tbody>
<tr>
<td>10%</td>
<td>Homework &amp; Class Attendance</td>
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<tr>
<td>25%</td>
<td>Midterm Exam</td>
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<td>40%</td>
<td>Class Project</td>
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<td>25%</td>
<td>Final Exam</td>
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Final grade will be determined by overall average as follows:

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<thead>
<tr>
<th>Score</th>
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<tbody>
<tr>
<td>90-92.99</td>
<td>A-</td>
<td>93-96.99</td>
<td>A</td>
<td>97-100</td>
<td>A+</td>
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<tr>
<td>80-82.99</td>
<td>B-</td>
<td>83-86.9</td>
<td>B</td>
<td>87-89.99</td>
<td>B+</td>
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<td>70-72.99</td>
<td>C-</td>
<td>73-76.9</td>
<td>C</td>
<td>77-79.99</td>
<td>C+</td>
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<td>60-62.99</td>
<td>D-</td>
<td>63-66.9</td>
<td>D</td>
<td>67-69.99</td>
<td>D+</td>
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<td>0-59.99</td>
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Textbooks
Required Text:
- *Design Patterns: Elements of Reusable Object-Oriented Software* by Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides; ISBN: 978-0201633610

Recommended Texts:
- *Head First Object-Oriented Analysis and Design* Brett D. McLaughlin, Gary Pollice, Dave West ISBN: 978-0596008673

Course Topics
Course topics are expected to include, but are not limited to:
- Building quality software systems
- Introduction to OO development processes: test-driven development, pair programming, agile development
- User stories and system specification
- Refactoring and design improvement
- Universal Modelling Language (UML) for software architecture and state
- Design Patterns: their intent, applicability, benefits, and drawbacks, structure, and implementation
- Advanced object-oriented programming for implementation of certain patterns (interfaces, inner classes, virtual functions, private and multiple inheritance)
- Inter-personal dynamics that occur within a small project team

Class Policies
- **Class Attendance:** Students are required to attend class. Class time will be frequently used as project time; if students are not in class, their team will be adversely affected by their absence. Class attendance will be taken often and will count as a homework assignment grade. **Attendance WILL be taken on project kickoff and project presentation days.**
- **Moodle:** The course Moodle will be the official avenue for communication between the instructor, teaching assistants, and students. Moodle will be used for providing general course information, making announcements, making assignments, turning in assignments, and posting grades. Check it often for new or updated information. If you don’t see something in Moodle that you think should be there, report it to the instructor as soon as possible.
- **Communication:** All electronic communication between students and the instructor and teaching assistants should maintain a professional decorum (e.g., address the recipient properly, use whole words, complete sentences, and proper grammar). Be sure to include enough detail of the problem so that you form a well-thought out question. The more detail you can give as to your problem, the more likely the instructor or teaching assistant will be able to help you.
• **Distractions:** Please silence your phones and put them away at the beginning of every class. If you receive an urgent call or text during class, please take the device into the hall to complete your call/text. If you must enter class late or leave early, please do so as quietly as possible. Please avoid activities that will distract your classmates (e.g., talking, rustling papers, moving around), etc. The instructor reserves the right to expel a student from the lecture room for distracting, disruptive, or disrespectful behavior.

• **Preparation for class:** It is important that you come to class prepared. That includes completing the reading assignment in advance and bringing pencil(s) and paper for in-class quizzes and practice problems.

• **Grading Change requests:** All grades are uploaded to the course Moodle. Concerns about grades must be addressed within one week after the graded work is made available. Thereafter, all grade book entries are final. Grade change requests must be submitted to the instructor, in writing, and must include the following:
  - Name of student
  - Date of the assignment/project/exam
  - Date of submission
  - Course number
  - List of the items that need to be corrected along with a concise reason as to why the grade change is needed.
  - Original assignment/test/quiz (not a copy).

Grade change request decisions are at the discretion of the instructor and will be returned as the instructor has time to complete the regrade. Final exam and final grade change requests can be submitted up to two weeks after the final exam. After that time, grade change requests will be denied.

• **Due Dates:** All work intended for grading must be submitted on time. Any work not submitted before the cut-off period is not graded. Programming projects will be Zipped and submitted on the course Moodle. Homework assignments will be taken on or uploaded to Moodle. **Moodle is unforgiving, so do not wait until the last minute to upload your assignment.**

• **Missed Assignment/Exams:** A grade of 0 is awarded for missed assignment/exam in the absence of a valid excuse, as determined by LSU policy. In the unusual circumstance that you must miss an assignment or exam due to medical reasons or other unforeseen emergency, you need to notify the instructor as soon as possible and provide sufficient documentation to verify the claim. The instructor will be following LSU policy PS-22 with regards to valid reasons for missing an exam. If the instructor deems that the excuse is valid and sufficiently documented, the instructor will determine how the missed work will be made up, depending on the circumstance.

• **Special Accommodation:** Students who have a disability that require accommodation(s) should make an appointment with the Office of Disability Services (Phone (225) 578-5919 or TDD: (225) 579-2600) to discuss their specific needs and present a letter from the ODS informing the instructor of their needs. All such matters, by University regulations, are strictly confidential.

• **Collaborative Work:** All homework assignments must be the independent work of the student. Students are not allowed to use another student’s work, in part or in total, as their own work. Students are allowed to search for and use online and published sources of approaches, algorithms, and code. All approaches, algorithms, and code obtained from an outside source must be clearly marked in all turned in work or it will be considered plagiarism and academic dishonesty.

• **Exam Dates:**
  - Midterm Exam: Tuesday, March 8, during class
  - Final Exam: Wednesday, May 11, 3PM – 5PM

• **Project Dates:**
  - Project Kickoff: Tuesday, February 1
  - **Project Milestone #1** (5%): Project Proposal, due 11PM Tuesday, February 8
  - **Project Milestone #2** (20%): System Architecture, due 11PM Tuesday, February 22
    - In-class architecture review, Thursday February 24 and Thursday March 3
  - Core Features should be implemented by Thursday March 24
  - **Project Milestone #3** (60%): System Implementation, due 11PM Thursday, April 7
  - **Project Presentation** during class (10%): due 11PM Monday 4/28. In class presentations on Tuesday 4/19, Thursday 4/21, Tuesday 4/26, and Thursday 4/28
  - **Postmortem** (5%): due 11PM Wednesday, May 4; Discussion during class Thursday, 5/5
• **Important Dates:**
  o Wednesday, January 26 – Final day to drop without a W (4:30 PM deadline)
  o Thursday, April 14 – Final day for dropping classes (4:30 PM deadline)
  o Thursday, April 14 – Final day to request rescheduling a final examination when three examinations are scheduled in 24 hours

**Class Project**

- On project kickoff day, the instructor will provide a project framework that project teams must adhere to. Teams are responsible for choosing the domain and application for their project.
- The class will be partitioned into teams of 6. Students may propose teams, but the instructor reserves the right to shuffle teams to ensure teams of size 6.
- While teams are expected to equitably divvy responsibilities among team members, all team members are required to implement system and/or software designs in Enterprise Architect, all team members are required to implement some portion of the functionality, and all team members are required to participate in the in-class final project presentation.
- The team must select a leader that will take on the responsibility of coordinating the team efforts.
  o The team leader is expected to shoulder leadership responsibilities in addition to project responsibilities.
  o If the team leader provides good project leadership, they will get extra project points for their leadership efforts.
  o If the team leader fails to effectively lead the team, the team leader can lose project points.
  o The team may choose to change leadership for different Milestones, upon instructor approval.
- Feedback and recommendations for improvement on a milestone is expected to be addressed in the subsequent milestone.
- Project grades are calculated as follows:
  \[
  \sum_i \left( \text{Weight}_i \times \text{Grade}_i \times \text{PercentContribution}_i \right) 
  \times \text{NumTeamMembers} \times L_i
  \]
  o Where \( i \in \{\text{Proposal, Milestone 1, Milestone 2, Presentation, Postmortem}\} \)
  \[\begin{align*}
  \text{Weight}_{\text{Milestone 1}} &= 0.05 \\
  \text{Weight}_{\text{Milestone 2}} &= 0.20 \\
  \text{Weight}_{\text{Milestone 3}} &= 0.60 \\
  \text{Weight}_{\text{Presentation}} &= 0.10 \\
  \text{Weight}_{\text{Postmortem}} &= 0.05 \\
  \end{align*}\]
  o \( \text{Grade}_i \) is the grade awarded to the team project for Milestone \( i \)
  o \( \text{PercentContribution}_i \) is the percentage that an individual team member contributed to the milestone. It is expected that every team member will contribute approximately the same amount to each milestone, but this factor corrects for the situation when contribution is not equitable within a team. This factor is determined by a survey of team members.
  o \( L_i \) is the leadership offset for Milestone \( i \) (either 1.05, 1.0, or 0.95)
Communication Across the Curriculum (CxC)
This is a certified Communication-Intensive (C-I) course which meets all of the requirements set forth by LSU’s Communication across the Curriculum program, including

- instruction and assignments emphasizing informal and formal technology communication;
- teaching of discipline-specific communication techniques;
- use of feedback loops for learning;
- 40% of the course grade rooted in communication-based work; and
- practice of ethical and professional work standards.

Students interested in pursuing the LSU Communicator Certificate and/or the LSU Distinguished Communicator Medal may use this C-I course for credit. And don’t forget to check out the CxC Studio resources for additional support with all your communication projects in this class and beyond! For more information, visit www.cxc.lsu.edu.

Expectations
LSU’s general policy states that for each credit hour, you (the student) should plan to spend at least two hours working on course related activities outside of class. Since this course is for three credit hours, you should expect to spend a minimum of six hours outside of class each week working on assignments for this course. Visit here for more information regarding general information for courses.

LSU Student Code of Conduct
The LSU student code of conduct explains student rights, excused absences, and what is expected of student behavior. Students are expected to understand this code as described on the Code of Conduct page. Any violations of the LSU student code will be duly reported to the Dean of Students.

Academic Integrity
All assignments will be monitored against academic dishonesty. Examples of academic dishonesty include, but are not limited to:

- Accessing the solution manual to the text and copying the solution before attempting the problem on your own, while attempting the problem on your own, or after checking your work and finding your solution to be incorrect.
- Copying a problem solution from a classmate (be it one problem or the entire problem set). The copy may be identical or a rearranged version of another student.
- Giving your completed problem set to another student who has not yet completed their problem set.
- Copying a solution from another student verbatim.
- Peeking at a problem solution without the knowledge of the spied upon student.

All students, regardless of level of guilt, will be reviewed by SAA (Student Advocacy and Accountability) in the event that an academic misconduct violation is detected.

- This is particularly important for those of you who “share” your homework with others. Many times this is done with the best of intentions to help a classmate, but the classmate may copy your solution and present the work as their own. The “sharer”, in the eyes of the university, is just as guilty as the copier.
- Keep your work safe. Never leave your homework with other students or send your solution to other students.

If there is evidence of academic misconduct on homework assignments, programming projects, quizzes or exams, all involved parties will be submitted to SAA for review.

Disabilities
Each course syllabus should contain a statement reflecting compliance with The Americans with Disabilities Act and the Rehabilitation Act of 1973, as amended, Section 504. This link contains four example statements: Sample Syllabus Statements | LSU Disability Services
Academic Success
The primary ingredients of your academic success are attending class, managing your time efficiently, taking good notes, and developing good critical thinking and communication abilities. LSU has a number of excellent resources that will assist you in developing these skills. The place to begin is the Center for Academic Success (CAS). The CAS offers guidance on what learning strategies are best suited to your talents, tutoring in the basic subjects, and workshops on a variety of topics, from note taking to time management. Communication Across the Curriculum assist students in developing the communication skills necessary for academic and professional success. Finally, with respect to professional success, the LSU Olinde Career Center can assist you in choosing a major and a profession that best suits your talents and passions and help you develop a four year career plan to ensure success when you graduate from LSU.

Diversity, Equity & Inclusion Statement
We believe diversity, equity, and inclusion enrich the educational experience of our students, faculty, and staff, and are necessary to prepare all people to thrive personally and professionally in a global society. Therefore, LSU is firmly committed to an environment that affords respect to all members of our community. We will work to eliminate barriers that any members of our community experience.

To make LSU a place where that can happen, we must recognize and reflect on the inglorious aspects of our history. We now acknowledge the need to confront the ways racism, sexism, ableism, ageism, classism, LGBTQ+ phobia, intolerance based on religion or on national origin, and all forms of bias and exploitation have shaped our everyday lives.

We accept personal and professional responsibility to eliminate bias and oppression wherever they are found. We understand our obligation to speak up when we see bias whether it be in our teaching, study, or daily work. Our community will educate themselves proactively and continuously about how to intervene and bring bias to the attention of others with commitment and compassion.

We will hold ourselves accountable for our actions and inactions, and for maintaining intentional, measurable, and meaningful efforts to enhance diversity, equity, and inclusion, including through ongoing evaluation of our policies, practices, and procedures.
Nondiscrimination, Sexual Harassment, & Title IX

LSU provides equal opportunity for all qualified persons in admission to, participation in, or employment in the programs and activities which the university operates without regard to race, creed, color, marital status, sexual orientation, gender identity, gender expression, religion, sex, national origin, age, mental or physical disability, or veteran’s status. LSU has implemented a procedure to address complaints for those who believe they have been subjected to discrimination and/or harassment in violation of this policy. Please know that your instructors are here to support you and listen to your experience. We also want you to know that we are mandatory reporters and must report what we know to the Office of Civil Rights and Title IX. All LSU employees, with few exceptions, are required to report instances of sex-or gender-based harassment and discrimination, including sexual misconduct and power-based violence (e.g. sexual assault, stalking, dating violence, domestic violence, sexual exploitation, retaliation, etc.) for which they may not be the victim, but of which they are aware. The Office of Civil Rights & Title IX is the LSU office responsible for investigating complaints regarding any type of discrimination, sexual harassment, or power-based violence. The Office of Civil Rights & Title IX is located in 118 Himes Hall and the phone number is 225-578-9000. If you are aware of an individual who has been victimized, you are encouraged to contact the Office of Civil Rights & Title IX or file an online report by going to www.lsu.edu/support and clicking the Report An Incident box.

If you have been assaulted, harassed, or a victim of violence, we encourage you to contact the Office of Civil Rights & Title IX. Please reach out for help immediately. Some excellent resources available to Baton Rouge residents include:

1. STAR (Sexual Trauma Awareness and Response; 24/7 hotline: 1-855-435-STAR
2. IRIS Domestic Violence Center; 24/7 hotline: 1-800-541-9706
3. THE PHONE Baton Rouge; 24/7 hotline: 225-924-3900
4. The Lighthouse Program; 225-578-5718

For additional information visit www.lsu.edu/civil-rights. LSU's policies on sexual harassment (PM 73) and sexual harassment of students (PS-95) are available on the LSU. Website