Syllabus
(Sp24)
CIT 490: Senior Research

Faculty: Yaser Mowafi, Ph.D.

Course Description

Students work on capstone research projects utilizing skills and knowledge from prior courses in the program. Projects performed, when possible, for a specific client or local industry.

Credit Hours: 3

Prerequisite: Consent of Instructor

Objectives and Learning Outcomes

This course contributes to the following outcomes:

1. identify, formulate, and solve information technology problems by applying principles of engineering, science, and mathematics
2. apply information technology design to produce solutions that meet specified needs with consideration of public safety and welfare, as well as cultural, social, and economic factors
3. communicate effectively with a range of audiences
4. recognize ethical and professional responsibilities and make informed judgments, which must consider the impact of information technology solutions in economic and societal contexts
5. establish goals, plan tasks, and meet objectives
6. develop and conduct appropriate experimentation, analyze and interpret data, and use judgment to draw conclusions
7. acquire and apply new knowledge as needed, using appropriate learning strategies

Welcome!

Welcome to CIT 490 –Capstone Senior Research. My name is Yaser Mowafi, Ph.D. and I am anticipating a rewarding and fun experience.

Class Location/Times

SH B103 Tue 4:00 pm-06:45 pm

The course is conducted using lectures and labs. Lectures provide the course material content, and Lab sessions provide the instruction on the course assignments and general discussion.

The class material is available at the following website: https://blackboard.wku.edu

Attending class on time is routinely expected.
Cell phones and beepers are to be turned off before entering the classroom.

Instructor Information
Name: Yaser Mowafi, Ph.D.

Office: COHH, RM 2110

Email: yaser.mowafi@wku.edu Phone: Voice 270-745-3415

My office hours: TR 10:00 am – 12:30 pm, or by appointment.

Email is the best method of contact. I usually respond in less than 24 hours except on weekends. Please don't wait until the weekend. Note that if you try to contact me late on Friday, you will likely not get a response until late Sunday or early Monday.

Course Structure
The course allows students to contribute original work and/or ideas of a chosen CIT field theme (see Capstone Themes Section below) utilizing applied research methods. This course is primarily oriented around producing a capstone project or research paper. Students will incorporate some dedicated time to work on the research work, and there will be assignments due at regular milestones. Students must submit their topic to their instructor for approval by the end of the second week of the academic semester. Once a topic is approved, students must submit the first draft of the capstone proposal by the end of the fifth week. The project will culminate in documentation that demonstrates a broader understanding of the chosen CIT discipline.

Topic Selection
Due to the technical nature of the capstone projects, students must submit their topics to the instructor for approval by the end of the second week of the academic semester. Once a topic is approved, students must submit the first draft of the capstone proposal by the end of the fifth week. A topic proposal must:

- State a goal or a problem to be solved. For example, enable or apply a new product or service, produce new information for better decision-making or customer satisfaction.
- Offer a technological solution and explain how the technology will be implemented.
- Provide parameters to measure success.
- Refer to IT research, industry literature, and academic sources.

Students may form their own teams and each team will choose their own topic. Students can be allowed to form a group, if:

- Each student has contributed significantly to the completed work project in their work environment.
- Each student is able to submit proof of their significant involvement in their project.
- The instructor, based on the above criteria, approves the exemption and accepts the previous work products.

Students wishing to be considered for group projects must contact the instructor during the second week of the semester. If the exemption is granted, the student's project grade will be based on the submitted work using the same criteria as for the course project.

Capstone Themes

Networking and Security: Students will work on enabling a computer networking and security themed product. The work will progress from product conception to requirements to design to implementation to evaluation. Work will incorporate key computer security tools and practices, including threat modeling, penetration testing, and bug fixing. Examples include password managers, censorship resistance systems, and mobile payment systems. Students will tie together and apply previous experiences from CIT 370, 372, 416, 472, 476, 482 and other classes.

Systems Development and Programming: Students will work to apply software engineering and system design skills toward building or enabling a novel computing application applied to computing scenarios. Students will follow a human-centered design process to ideate, design, and prototype or showcase their novel system. Students will tie together and apply previous experiences from CIT 330, 332, 432, 436, 456, 492 and other classes. This work gives hands-on experience with product cycle from design to deployment of computing application applied to computing scenario.

Database Administration and Data Analysis: Students will focus on selecting a data science question and crafting and evaluating a data science process to answer that question. Students will work to apply the end-to-end process of data management including transformation, exploration, modeling, and evaluation choices, performed with code: the iterative, and often exploratory, steps that analysts go through to turn data into results. The focus is not limited to the complete process, including transformation, exploration, modeling, and evaluation choices, but also to statistical modeling or machine learning, as well as visualization and database methods, Students will tie together and apply previous experiences from CIT 350, 352, 452, 454, 486, and other classes. This work gives hands-on experience with selecting a data science question, and with crafting and evaluating a data science process.

Final Paper: Outline & Writing Guidelines

The final paper for the capstone describes how information technology will help to achieve a work objective. The paper size is limited to 25 pages. The sections of the report that need to be completed for each of the three deliverables are described below. How students do their projects varies according to the type of project and the logistics in which the student is working.

Be sure to do what makes sense for the project and not just what others are doing. The suggestions below are not a set of rules that must be followed, they are for guidance only.

1. Research topic ***(Deliverable 1)***: This is done by defining the user population or the target environment, understanding their needs, and specifying the purpose of the design. Having done this, decide on a title that describes the project. Briefly summarize the purpose of the project. Write several paragraphs that briefly describe what the project should do and for whom. In points 2 and 3 below the problem definition requirements are described in more detail.
2. Characterizing the problem definition ***(Deliverable 2: Proposal Report)***. To do this, define the project more tightly so that a particular user population or target environment can be specified. Do this by selecting a group that can be accessed. For example, developing a product for seniors or children of a particular age, are representative users who can evaluate the designs.
   Write two or three paragraphs, which define the user population(s) or the target environment and describe their main characteristics. Some of the information can come from meeting with potential users, and some from other sources. Be sure to quote the sources and list the references at the end of your report. The format for doing this is described in the References section below.
3. Users' needs and requirements *(**Deliverable 2: Proposal Report***): Understanding users' or target environment's need(s) is one of the keys to successful research and design. This begins the design process, and then through iterative cycles of trying out design ideas and testing them, i.e., design-evaluate-redesign, refine the understanding of users' needs and how well the design meets these needs.
4. Modeling and design ***(Status Report I):*** Having defined the user population and understanding it is time to elaborate further on the design idea. Remember that there are two types of design: conceptual design, which deals with representing the main design concept (the objects and the actions on those objects that together form the conceptual design which must match the users' mental models of the system as closely as possible) and physical design, which concentrates on the low-level detailed design. Initially, it is important to develop the conceptual design, which is: "transforming needs and requirements into a conceptual model".
   As the conceptual design for your research project is developed, remember that now is the time that alternatives are considered. There is no single correct design, but some designs are certainly better than others. For this part of the ***status report*** deliverable, present scenarios and sketches to evaluate along with your representative users.
5. Analysis ***(Status Report II)***: In many respects design and analysis can become almost continuous during the early stages of design. These analyses can be quite informal. For example, one could develop scenarios and sketches, try them with several users and perhaps some colleagues and then refine them before evaluating them more thoroughly with a representative group of users. If this is possible, the first can be very informal and can involve simply showing the storyboards and asking users to comment on whether or not they would use them. The second could be more formal. This time three or four

representative users are asked to say how they would do some typical tasks by walking through the sketches of the interface.
Other forms of evaluation may also be useful depending on the type of project and the logistics of the process. Remember, that more than one evaluation and design iteration can be done if appropriate. Everything that is done should be reported. There may be more iterations of 'design-test-redesign'. Modify the process to fit the needs of the project.

6. Final report ***(Deliverable 3)***: As before, make refinements to the design based on the findings from the analysis; these should be documented. Provide a list of all the main tasks that the research project addresses. The third deliverable (along with the other two) is now ready for final grading with copies of all the design and analysis procedures (tasks, interview protocols, questionnaires, results, etc.).
7. References: The justification of the design or ideas that are from the class text, other written documents or the Web, should be acknowledged in the reference list. References should be presented in American Psychological Association (APA) format. For example, in text it might be witted: "According to Preece (2000) sociability and usability are essential concepts for the design of successful online communities". The list the reference in the reference list at the end of the paper appears as follows: Preece, J. (2000) *Online Communities: Supporting sociability, designing usability*. Chichester, UK: John Wiley & Sons. A chapter in a book would be cited in the text in a similar way by author(s) and date and listed in the reference list as: Preece, J. and Ghozati, K. (2001) Observations and Explorations of Empathy Online. In. R. R. Rice and J. E. Katz, *The Internet and Health Communication: Experience and Expectations*. Sage Publications Inc.: Thousand Oaks. 237-260. A-journal article would be listed as: Preece, J. (2001) Sociability and usability: Twenty years of chatting online. *Behavior and Information Technology Journal*, 20, 5, 347-356. References for material cited from a website must give the full web URL and also state the date that the material was viewed in parentheses. For example: www.wku.edu/news (viewed August 8, 2023).
Note which parts of the references above are presented in italics and which are not. Book and journal titles tend to be shown in italics.
8. Acknowledgements: In a concise statement acknowledge the help that was received from others. This usually takes a form like the following: "We thank my instructor, Dr. Patel, for guidance while working on this project. We also thank the other students in the class and Carey Robertson for their comments, which enabled us to improve the design and this report."
9. Appendices: As the prototype sketches, and evaluation materials such as task descriptions, questionnaires, interview scripts, evaluation results, etc. are developed, a copy to the appendices should be added. By putting these materials in the appendix, they can be referenced without cluttering up the report itself with detail that might distract the reader from the main issues.

See below links on research guides and "technical–academic" writing style:
https://libguides.usc.edu/writingguide/purpose

https://www.harvardwrites.com/
https://guides.library.harvard.edu/gsd/write/academic
https://owl.purdue.edu/owl/general_writing/common_writing_assignments/research_papers/index.html
https://writingcenter.fas.harvard.edu/pages/resources

Grading

Grade Distribution:

Research Project	Percentage
Research topic and problem definition	*10%*
Proposal Report	*20%*
Final Paper	*70%*
Total	*100%*

Grading Letter and Distribution:

A	90 – 100%
B	80 – 89%
C	70 – 79%
D	60 – 69%

Grade Reporting

Students will be required to check Blackboard for posting of grades throughout the term.

Academic Dates

To determine important academic dates such as the last day to drop with a W, or the final exam schedule, please see https://www.wku.edu/restart/bigredrestartcalendar/

Work Submission

- All work must be submitted online via Blackboard.
- Any student found cheating or found to have plagiarized from other material (or using any materials) will receive a grade of 0 for that submission and may face further disciplinary action according to university policy.

Ogden Student Course Attendance Statement

The faculty and staff of Ogden College of Science and Engineering are committed to providing you with learning experiences and opportunities. You must assume ownership of your education and be an active participant in the classroom and laboratory to take advantage of these opportunities. Active participation requires you to attend. Scientific studies have shown that attendance during scheduled classroom and laboratory meetings is directly correlated to your performance on assignments and exams and the potential to earn higher grades. Additionally, if you do not regularly attend class, you are missing important information about course topics,

due dates, and assignment details that are crucial to your success in the course. Therefore, as a student enrolled in an Ogden course, you are expected to attend every class meeting and to inform your instructor regarding the reasons for any absences as soon as practical. Your instructor may incorporate class attendance/participation as part of the grading criteria.

Attendance Policy

Because this is an online course there is no classroom attendance requirement. However, I strongly encourage you to remain actively involved in this course. Some suggestions for doing this are: 1) check your WKU email and Blackboard regularly for course announcements and information; 2) stay abreast of all due dates as they are added to the course schedule on Blackboard; 3) complete all work on time and to the very best of your ability.

Incompletes

All incomplete requests must follow school guidelines. See the catalogue.

Extra Credit There is no extra credit or make-up work as the class assignments reflect what is required for the successful completion of this course.

Outline

Week	You should be working on:	Deliverable
1	Introduction Start on topic selection/group selection	
2	Topic selection/group selection	
3	Problem definition Start on the proposal draft	Research Topic
4	Structured requirements	
5	Structured requirements	
6	Structured requirements Start on modeling and design	Proposal Report
7	Modeling and design	Resubmit Proposal Report
8	Modeling and design	
9	Modeling and design Start on analysis	Status Report I
10	Analysis	
11	Analysis	
12	Analysis Start on final research paper	Status Report II

13	Final research paper	
14	Final research paper	Final Research Paper
15	Catch-up time	Resubmit Final Research Paper
Note: The deadlines below allow for some slack in the completion of the content areas. If you cover the content at the pace indicated above in the recommended schedule, you should be able to complete all assignments well ahead of the deadline, as recommended. Thus, the deadlines below should be considered "drop dead", or absolute latest dates. All assignments are due by Friday **midnight** of the due week.		
No extensions will be granted, and no credit will be given for late submissions.		

Academic Standards

I expect all students to support the same respect for individuals, commitment to issue and problem resolution, and open communication and feedback as in any learning environment. Specifically, all students are expected to:

- Accept responsibility and accountability for all use actions and content posted to any online classroom, public meeting or personal inbox (email).
- Maintain the same ethical standards expected in a collaborative, academic environment.
- Demonstrate respect for all faculty, students, and staff regardless of age, race, gender, religion, national origin, veteran's status, disability, or sexual orientation.

In the online environment, the following will not be tolerated:

- Harmful, threatening, libelous, or abusive content.
- Profanity of any kind.
- Copyright infringement or violation of patent, trademark, proprietary information, or confidentiality agreements.
- Misrepresentation of identity through alteration of inbox (email) names.
- Posting unsolicited advertisements to public meetings or private inboxes- no spamming!
- Transferring computer viruses, intentionally or unintentionally, or other code that disrupts or interferes with other users' use of the online environment or personal computers, systems, or networks.

Honesty

I highly value academic honesty. Please see https://www.wku.edu/studentconduct/process-for-academic-dishonesty.php

A student must always submit work that represents his or her original words or ideas. If any words or ideas are used that do not represent the student's original words or ideas, then the student must cite all relevant sources. The student should also make it clear the extent to which such sources are used.

Words or ideas that require citation include, but are not limited to, all hardcopy or electronic publications, whether copyrighted or not, and all verbal or visual communication when the content of such communication clearly originates from an identifiable source.
All submissions to any public meeting or private mailbox fall within the scope of words and ideas that require citations if used by someone other than the original author.
Academic dishonesty in an Online learning environment could involve the following:

- Having a tutor or friend complete a portion of your assignments
- Having a reviewer make extensive revisions to an assignment
- Copying work submitted by another student to a public class meeting
- Using information from online information services without proper citation

Any of these practices could result in charges of academic dishonesty. Sanctions range from failing assignments or class grades to expulsion.
I consider academic honesty a very serious issue. I have and will fail students that I discover are not adhering to the above guidelines.

Use of AI Tools

In general, I expect that the work you submit in this class will be your own and you are ***not*** authorized to use artificial intelligence (AI) tools such as (*list relevant examples*) or for (*list assignments*). If you choose to use these tools, your actions will be considered academically dishonest and a violation of the WKU Student Code of Conduct.

Class Navigation

Go to http://blackboard.wku.edu and follow the login instructions (usually available by the first day of class). This site will be the primary means for quizzes, grades, announcements, exam and homework scores, reading materials, discussions, and other supplemental course information that you will need. Please be sure and check this site regularly.

Computer Access

This class requires each student to make use of several software packages, various other software tools and the Internet. All required resources are available either in the general Student Computer Labs across campus, on WKU Extended campuses, and typically, at public libraries. Lack of hardware, software and Internet connectivity at home to complete any assignment is not an acceptable reason for not completing work. You may work from any location you prefer (home, work, etc…), but you will need access to MS Office software.

Technology Issues

School servers are unavailable from time-to-time. Accordingly, I will accept e-mailed assignments to my personal mailbox for time-stamping purposes only. However, once Blackboard is available to you, in order to receive a grade, the assignment must be posted to the designated discussion board as detailed in this syllabus.
Please make sure that you have a reliable network connection prior to your attempts to take online exams, to avoid any Blackboard system lock-up during a quiz or exam. If this happens, please contact me as soon as possible. Also, from time to time the Blackboard system will lock-

up during a quiz or exam. If this happens, please contact me as soon as possible. I can only reset the exam, which means you will have to take it over (this includes final exams). If you wait until the last minute to take an exam, you may not be able to reset due to time limitations.
For comments/complaints about technology issues (for example, Blackboard exam problems), please contact the Office of the Chief Information Technology Officer (270-745-2243).
http://www.wku.edu/infotech/index.php?page=VP

Late Assignments
Due to the nature of this course and based upon my teaching experience, it is critical that you are timely in submitting the assignments. Since all assignments are made available before they are due, no late work will be accepted for any reason. Again, no late work will be accepted for any reason. Please do not wait until the last minute to do your assignments; no late work will be accepted for any reason.

Cancellations
If you are dropped for any reason (lack of payment, etc.), your access to Blackboard may be terminated. In this event, you will NOT be permitted to make up online course assignments/activities during the time you lost access to Blackboard.

Student Disability
Services Students with disabilities who require accommodations (academic adjustments and/or auxiliary aids or services) for this course must contact the Office for Student Disability Services, Room 445, Potter Hall. The OFSDS telephone number is (270) 745-5004 V/TDD.
Please DO NOT request accommodations directly from the professor or instructor without a letter of accommodation from the Office for Student Disability Services.

Title IX Misconduct/Assault Statement
Western Kentucky University (WKU) is committed to supporting faculty, staff and students by upholding WKU's Title IX Sexual Misconduct/Assault Policy (#0.2070) at https://wku.edu/eoo/documents/titleix/wkutitleixpolicyandgrievanceprocedure.pdf and Discrimination and Harassment Policy (#0.2040) at https://wku.edu/policies/hr_policies/2040_discrimination_harassment_policy.pdf.
Under these policies, discrimination, harassment and/or sexual misconduct based on sex/gender are prohibited. If you experience an incident of sex/gender-based discrimination, harassment and/or sexual misconduct, you are encouraged to report it to the Title IX Coordinator, Andrea Anderson, 270-745-5398 or Title IX Investigators, Michael Crowe, 270-745-5429 or Joshua Hayes, 270-745-5121.
Please note that while you may report an incident of sex/gender-based discrimination, harassment and/or sexual misconduct to a faculty member, WKU faculty are "Responsible Employees" of the University and ***MUST*** *report what you share to WKU's Title IX Coordinator or Title IX Investigator. If you would like to speak with someone who may be able to afford you confidentiality, you may contact WKU's Counseling and Testing Center at 270-745-3159.*
ADA Accommodation Statement

In compliance with University policy, students with disabilities who require academic and/or auxiliary accommodations for this course must contact the Student Accessibility Resource Center located in Downing Student Union, 1074. SARC can be reached by phone number at 270-745-5004 [270-745-3030 TTY] or via email at sarc.connect@wku.edu . Please do not request accommodation directly from the professor or instructor without a faculty notification letter (FNL) from The Student Accessibility Resource Center.

Schedule Exceptions

I will not approve any schedule exceptions.