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Course Information:

Title: Data Representation and Organization

Course Number: INFO-C307

Credit Hours: 3

Prerequisites: INFO-C211 (Second semester of Java Programming)

Semester: Fall 2023

Instructor Information:

Name: Dr. Md Nour Hossain

Email: mhossai@iu.edu

Phone: 7654559498

Office: Hunt Hall – SM 206G

Zoom Office Hour: By Appointment through zoom – (Preferred: Monday and Wednesday, 11:00 AM to 12:00 PM).

Preferred Communication Channel: Canvas **Inbox** is my preferred means of contact. I will return your e-mails within 48 business hours. In case of emergency only email me at mhossai@iu.edu. Please mention your course number in the subject line.

Office Hours zoom Information:

Meeting ID: 975 0591 5002

Password: Private123

Clickable Zoom Link.

Instruction Mode:

100% Online.

Course Description:

This course covers the basic structure of information representation in digital information systems. Three aspects related to information representation will be discussed in this course. Firstly, the course begins with discussing low-level computer representations such as common character and numeric encoding. Secondly, the course presents an introductory study of common data structures and algorithms encountered in computing problems, focusing on methods of representing structured data, and techniques for operating on data structure. Finally, the course discusses XML and its related technologies as a medium for storing, displaying, and retrieving data.

Learning Outcomes:

The student who completes this course will be proficient in:

- basic method of representing data inside a computer (characters and numbers)
- binary, octal and hexadecimal number systems.
- basic arithmetic manipulation of binary numbers.
- basic techniques in representing different types of data. (Integer, Char, Boolean, String, Array, Sound, Images, Video, etc.)
- implementation of basic data structures such as queues, stacks, trees and hash tables.
- XML and JSON document format and validation

At completion of this course, the student will be able to:

- Demonstrate understanding of numbering systems including binary, octal and hexadecimal
- Perform arithmetic manipulation of binary numbers
- Demonstrate ability to use methods for representing data inside a computer (characters and numbers)
- Demonstrate utility with standard data structures, including stacks, linked lists, queues, trees, and hash tables.
- Practice various techniques and algorithms used for basic sorting, searching, and manipulating data.
- Develop skills in using basic algorithm complexity
- Practice XML document format and validation
- Utilize techniques for metadata representations and retrieval using XML, XML Schema, XSLT, and XPath or XQuery

PROGRAM LEARNING OUTCOMES:

This course satisfies the following informatics degree program goals:

- Understand and utilize digital representations of information for presentation and/or processing.
- Organize information in a database.
- Organize and categorize information to improve understanding and interpretation of the data.

Resources:

Required Textbook:

No textbook is required for this course. Instructors will provide handouts, references and material

Recommended Supplements

Instructor will announce other reading supplements as class progresses

Course Evaluation:

Modes of Evaluation:

Component	Quantity – (Drop Quantity)	Weight	Work Type
Class Participation	N/A	10%	Individual
Take Home / Activities	N/A	30%	Individual
Assignment	5 – (lowest 1)	30%	Individual
Midterm	1	15%	Open Book
Final	1	15%	Open Book

Letter Grade:

The following letter grade designation will be used to recognize a student's achievement in a course:

Percentage Grade	Letter Grade	Points
97 – 100	A+	4
93 – 96	A	4
90 – 92	A-	3.7
87 – 89	B+	3.3
83 – 86	B	3
80 – 82	B-	2.7
77 – 79	C+	2.3
73 – 76	C	2
70 – 72	C-	1.7
67 – 69	D+	1.3
63 – 66	D	1
60 – 62	D-	0.7
59 and Below	F	0.0

Class Participation(CP)/ What you have learned:

In order to receive your class participation points (10%), it is **MANDATORY** to achieve the weekly **entry passes**. The entry pass is a quiz where in a one(few) paragraph(s) you will have to explain what you have learned from immediate/previous lecture associate to the CP. You are highly encouraged to include examples while you are explaining.

If you have any doubt about any of the topics that we have covered in our last lecture, please ask questions (minimum one) to clarify your doubt. We will use the submission comment and/or discussion board to answer a few to many of those questions to make sure our class understanding is comprehensive.

You will have to prepare for the quiz by reviewing the content associated to the quiz. You are highly encouraged to make your quiz content ready before attending the following lecture.

Take Home (TH):

Take-home is the small quiz that I will usually conduct based on each (section of a) lecture. I refer to it as a take-home because it embodies the knowledge you are carrying home with you from the lecture. You can work as a group with your team (see Canvas people setion) to comprehend your understanding and solve the take-home. But the final write-up should be done by individual student. Each take-home will have a number. In case of pdf submission, along with this number you will have to put your name, student number, date and your solution. This activity is the reflection of your active class participation (your understanding) and would be rewarded by providing a 30% of your total grade.

Assignments:

Assignment questions will be grouped into 5 assignments; each of this will usually be due about two weeks after they are released.

It is highly encouraged to work as a group to comprehend your understanding and solve the assignments. But the final write-up should be done by individual student.

The lowest one assignment score will be dropped. It is essential that you meet the deadlines for the Assignment Questions; there is not credit for documents handed in after the deadline.

Midterm:

It would be a open book examination and absolutely no collaboration during midterm. Details to be announced.

Final:

It would be a open book examination and absolutely no collaboration during final. Details to be announced.

Course Adaptation:

The instructor and university reserve the right to modify elements of the course during the term. The university may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes. It is the responsibility of the student to check their IUK email and Canvas regularly (**at least twice a week**) during the term and to note any changes.

Academic Ethics:

You are expected to exhibit honesty and use ethical behavior in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity.

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behavior can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: “Grade of F assigned for academic dishonesty”), and/or suspension or expulsion from the university.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various types of academic dishonesty please refer to the Code of Student Rights, Responsibilities, and Conduct at Indiana University located at:

[Student Rights, Responsibilities, and Conduct at IUK](#)

The following illustrates only four forms of academic dishonesty:

1. Plagiarism, e.g. the submission of work that is not one’s own or for which other credit has been obtained.
2. Collaboration where individual work is expected.
3. Improper collaboration in group work.
4. Copying or using unauthorized aids in tests and examinations.

Academic Accommodation of Students with Special Needs:

The IU Kokomo Accessibility Center seeks to empower, support, and advocate for students with special needs. Enhancing the education of each of our students means we construct a service plan

that is unique to the needs of each student. We strive to meet the instructional, environmental, and learning needs by providing accommodations, resources and referrals, and programs to assist students in reaching academic success. For further details please visit the following links: [ADA-IU-KOKOMO](#) & [Accessibility Services](#)

IU Kokomo Student Policies

Accommodations for students with disabilities:

Every attempt will be made to accommodate qualified students with disabilities (e.g., mental health, learning, chronic health, mobility, hearing, vision, neurological, etc.). You must have established your eligibility for support services through the appropriate office that services students with disabilities. Note that services are confidential, may take time to put into place, and are not retroactive; captions and alternate media for print materials may take three or more weeks to get produced. Please contact your campus office as soon as possible if accommodations are needed. Find your office at <https://accessibility.iu.edu/ada/requesting-accommodations/for-students/index.html>.

Sexual Misconduct:

As your instructor, one of my responsibilities is to create a positive learning environment for all students. IU policy prohibits sexual misconduct in any form, including sexual harassment, sexual assault, stalking, sexual exploitation, and dating and domestic violence. If you have experienced sexual misconduct, or know someone who has, the University can help. If you are seeking help and would like to speak to someone confidentially, you can make an appointment with the Counseling and Psychological Services (CAPS) KC 210D by calling 765-455-9203 or 765-455-9553, or email IUKCAPS@iuk.edu.

It is also important to know that University policy requires me to share certain information brought to my attention about potential sexual misconduct, with the campus Deputy Sexual Misconduct & Title IX Coordinator or the University Sexual Misconduct & Title IX Coordinator. In that event, those individuals will work to ensure that appropriate measures are taken and resources are made available. Protecting student privacy is of utmost concern, and information will only be shared with those that need to know to ensure the University can respond and assist. I encourage you to visit stopsexualviolence.iu.edu to learn more.

Civility Statement:

Indiana University Kokomo encourages a climate of respect and inclusiveness that welcomes and embraces community members with diverse backgrounds and life experiences; deliberately seeks multiple perspectives; and supports the free and open exchange of ideas and civil discourse. Our community encompasses the life of the classroom including but not limited to an engagement in student life, service learning, travel abroad, and social media reflections. This community will thrive when we approach each interaction and conversation with an open mind and when each member respects the inherent dignity and worth of all people. Respect and civility should therefore be afforded to all individuals regardless of age, disability, educational background, family status, gender, gender identity and expression, nationality, race/ ethnicity, religion, position, sex, sexual

orientation, socioeconomic level, or veteran status at Indiana University Kokomo. [Click here to read the complete IUK civility statement.](#)

Student Code of Conduct:

Each campus has established its own procedures for implementing the Code for any procedures not governed by University-wide procedures. The procedures have been developed to provide students with a fair and equitable process focused on student rights when matters of academic and personal misconduct and other tangential problems arise. The Code articulates a commitment to civility and the respect for the dignity of all members of the campus community. To know more visit [Student Code of Conduct](#)

Make Up Policy (No Late Work):

Two distinct categories of deadlines exist: "Due on" and "Available until." It's important to note that "Due on" represents a flexible deadline; any submissions past this date will be marked as late. On the other hand, "Available until" designates the rigid and ultimate deadline. Submissions received after the "Available until" date will not garner any credits. However, there will be no penalties for submissions made between the "Due on" and "Available until" timeframe. It is strongly advisable to submit all assignments before the "Due on" date.

Failure to complete any class activity on-time due to negligence or poor time management will result in a zero grade. I always put life above living. To ensure a balanced approach to this course, unforeseen circumstances that prevent on-time participation (**only for assignments and exams**) will be taken into account, contingent on the situation. You are highly encouraged to contact me **BEFORE the due date or no later than 2 days** the final due date.

According to Indiana University regulations, students are normally not permitted to withdraw from a course during the last two weeks of a regular semester. For this semester, the [last date withdrawals](#) will be processed by the Registrar for IU students is **December 8, 2023**.

Please see the following page for all important dates of this semester: [Fall 2023](#).

Course Schedule (tentative):

Module#	Release Date	Topics	Ref / Submission	Assignment (Release)
1	Aug 22	<ul style="list-style-type: none">Class Introduction & Syllabus Overview	Class Participation	
1	24	<ul style="list-style-type: none">Decimal, Binary, Decimal to Binary	CP, TH	

Module#	Release Date	Topics	Ref / Submission	Assignment (Release)
2	29	<ul style="list-style-type: none"> Decimal <-> Binary <-> Hexadecimal 	CP, TH	
2	31	<ul style="list-style-type: none"> Integer Representations: unsigned and signed, one's com. 	CP, TH	AS1
3	Sep 5	<ul style="list-style-type: none"> Integer Representations: two's complement and all it together 	CP, TH	
3	7	<ul style="list-style-type: none"> Fraction Representation: Single and double precision 	CP, TH	
4	12	<ul style="list-style-type: none"> Data Representation: Text, Images, Sounds 	CP, TH	
4	14	<ul style="list-style-type: none"> AS1 Submission /Review / Intro 	CP, TH, AS1	AS2
5	19	<ul style="list-style-type: none"> Compression: Run length encoding, Huffman coding, ... 	CP, TH	
5	21	<ul style="list-style-type: none"> Compression: Image compression using JPEG 	CP, TH	
6	26	<ul style="list-style-type: none"> Coding: Encryption / AS2 	CP, TH, AS2	
6	28	<ul style="list-style-type: none"> Midterm 	Online	
7	Oct 3	<ul style="list-style-type: none"> Fundamental Data Structures 	CP, TH	
7	5	<ul style="list-style-type: none"> Fundamental Data Structures 	CP, TH	AS3
8	10	<ul style="list-style-type: none"> Fundamental Data Structures 	CP, TH	
8	12	<ul style="list-style-type: none"> Fundamental Data Structures 	CP, TH	
	17	<ul style="list-style-type: none"> No Class Fall Break 		
9	19	<ul style="list-style-type: none"> Sorting (selection & insertion) 	CP, TH	
9	24	<ul style="list-style-type: none"> Sorting (Quick Sort) 	CP, TH	
10	26	<ul style="list-style-type: none"> Sorting (Merge Sort) 	CP, TH	
10	31	<ul style="list-style-type: none"> Sequential Search, Binary Search, Tree ADT 	CP, TH,	AS4
11	Nov 2	<ul style="list-style-type: none"> Binary Search Tree /AS3 Submission 	CP, TH, AS3	
11	7	<ul style="list-style-type: none"> Hash Table 	CP, TH	
12	9	<ul style="list-style-type: none"> Graphs 	CP, TH	
12	14	<ul style="list-style-type: none"> Graphs 	CP, TH	
13	16	<ul style="list-style-type: none"> XML & DTD / AS4 Submission 	CP, TH, AS4	AS5
13	21	<ul style="list-style-type: none"> XML & DTD 	CP, TH	
	22-26	<ul style="list-style-type: none"> Thanksgiving Break (No Classes) 		
14	28	<ul style="list-style-type: none"> XML & DTD 	CP, TH	

Module#	Release Date	Topics	Ref / Submission	Assignment (Release)
14	30	• XSL & XSLT	CP, TH	
15	Dec 5	• XSL & XSLT / AS5	CP, TH, AS5	
15	7	• Reserve Day / Review		
16	TBA	Final Exam	Online	