Miyazaki International College

Course Syllabus

Fall 2020

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| Course Title ( Credits ) | IDS313 - Algorithmic Thought (3 credits) |
| Course Designation for TC | N/A |
| Content Teacher |
| Instructor | Anderson Passos, Ph.D. (実務経験のある教員) |
| E-mail address | apassos@sky.miyazaki-mic.ac.jp |
| Office/Ext | MIC 1-315/Ext. 725 |
| Office hours | Affixed to my office door |

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| About this instructor: |
| Anderson has graduated from Computer Science and worked in the IT industry for over 14 years, including 4 years of experience as System Engineer in Tokyo, Japan.パッソス先生はコンピュータサイエンスを卒業し、14年以上にわたりIT業界で働きました。これには、日本の東京でシステムエンジニアとして4年間の経験があります。 |

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| Course Description: |
| *Critical thinking is a requirement in everything we do. Being able to evaluate the surroundings (the context) and come up with a solution will dictate students’ development personally and professionally. Students will learn how to organize their ideas and to connect their thoughts through the development and resolution of algorithms. Students will also have the chance to experiment with real algorithm development through the application of basic programming language skills. This course is highly recommended for all students planning to take Fundamentals of Computer Programming.* |
| Course Goals/Objectives: |
| This course will provide students with tools for developing a critical sense of problem analysis and organization of ideas. They will often be challenged with algorithms that will gradually increase in difficulty level as students’ problem solving abilities evolve. Students will learn about:* Problem interpretation
* Problem/Solution evaluation
* Procedural thinking
* Critical thinking
* Practice algorithmic problem solving with minimal aid of computers, emphasizing paper-based strategies.
* Basic contact with computer programming
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| Tentative Course Schedule |
| Day | Topic | Content/Activities |
| 1 | Introduction | * Syllabus review
* Introduction to course topics
 |
| 2 | * Multiple solution problems
* Activity: People attending an event
 |
| 3 | * How do an algorithm work
* Black box concept
 |
| 4 | Algorithm Structure | * Structured language
 |
| 5 | * Understanding algorithms
* Understanding programs
 |
| 6 | * Computer model
* Address vs data
* Basic computer instructions
 |
| 7 | * Instruction execution
* Program execution
 |
| 8 | * Introducing abstraction
	+ Instructions
	+ repetitions
 |
| 9 | Elementary Concepts | * Algorithms and programing languages
 |
| 10 | * Problem breakdown
* Activity: Calculating roots of a second degree equation
 |
| 11 | Elementary Techniques | * Variables inside repetitions
* Conditional statements
 |
| 12 | * Repetitions inside conditions
* Conditions inside repetitions
* Activity: Checking if a number is odd or even
 |
| 13 | Technical Applications | * Fibonacci
* Factorial
* Series
* Prime numbers
 |
| 14 | Functions and Procedures | * Functions vs Procedures
 |
| 15 | * Modularity
* Code reuse
	+ Legibility
	+ Adding comments
 |
| 16 | * Main program
* Global variables
* Local variables
 |
| 17 | * Using functions and procedures
	+ Changing variables inside functions
	+ Parameters by value
	+ Parameter by reference
 |
| 18 | Data structures | * Complex data types
* Data access
 |
| 19 | * Linked data structures
* Persistent data structures
 |
| 20 | * Arrays
* Associative arrays
 |
| 21 | * Graphs
* Matrix
 |
| 22 | Sorting algorithms | * Algorithm design
* Algorithm comparison
 |
| 23 | * Insert
* Selection
 |
| 24 | * Merge
* Heapsort
* Quicksort
 |
| 25 | * Bubble
* Shell
* Comb
 |
| 26 | * Counting
* Bucket
* Radix
 |
| 27 | Computer Programming | * Program design
* Program Documentation
 |
| 28 | * Software Design Specification
* Software Development
 |
| 29 | * Software flow
* User interface and accessibility
 |
| 30 | * Content review for finals
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|  | Finals |  |
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| Course Policies (Attendance, etc.) |
| **Student Responsibilities**As a class member, you are responsible for attending all classes and arriving on time, for participating as a member of a group, and for completing and handing in all assigned work. **Attendance and Lateness*** You can be absent a maximum of 4 times
* If you are more than 20 minutes late, you will be given an absence
* Two lateness are equal to one absence

If you sum up more than 4 absences (e.g. 3 absences and 3 lateness), you will be asked to withdraw from the course. Failing to do so will result in an automatic “F” grade.**Homework**The homework should be handed in at the beginning of every class. All homework submitted after that will **not** be considered.**Excused Absences**Excused Absence forms should be brought to instructors as soon as possible. If you know you will be missing classes talk to us beforehand so we can arrange make-up work.**Late Assignments**It is your responsibility to look for the instructor and check what assignments are due.Also, if you miss a class, it is your responsibility to contact the instructors to get handouts and explanations (missing a class is no excuse for not handing in homework).**Plagiarism and Intellectual Honesty**Plagiarism is representing someone else's intellectual property--words, ideas, or images-as your own. It is a very serious academic offense and plagiarized work is not accepted in this course. Ask one of the instructors if you have any questions about this. You are responsible for understanding what plagiarism is and knowing how to avoid it in your work. |
| Required Materials: |
| * notepad
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| Class Preparation and Review |
| Students are expected to spend at least one hour preparing for every hour of lesson, and one hour reviewing and doing homework. Make sure you review your notes after each class and make sure you understand the topics covered. Instructors are available outside the classroom in case students need additional assistance (please check office hours on the first page of this syllabus).Very often, you will have homework assignments. Make sure you review those before coming to the next class. Also, check the class Content/Activities so you can be prepared for the class. |
| Grades and Grading |
| • Homework 10%• Projects 50%• Tests 20%• Participation 20%You will receive a mid-semester evaluation to let you know how you have been doing up to that point. |
| Notes: |
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Course Rubrics

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| ELEMENT | Exemplary (3 points) | Proficient (2 points) | Partially Proficient(1 point) | Unsatisfactory (0 points) | POINTS |
| Algorithm | To understand basic algorithms |  |  |  | \_\_\_/3 |
| To write algorithms using linked structures such as List, trees, and graphs |  |  |  | \_\_\_/3 |
| To apply and implement learned algorithm design techniques to solve problems |  |  |  | \_\_\_/3 |
| Data Structures | To describe the usage of various data structures |  |  |  | \_\_\_/3 |
| To design and apply appropriate data structures for solving problems |  |  |  | \_\_\_/3 |
| To understand how to choose the appropriate data structure to solve a problem |  |  |  | \_\_\_/3 |
| Participation | Often asks questions and shows interest to deepen knowledge |  |  |  | \_\_\_/3 |
| Posture | Always willing to help peers.Completes All class assignments.Often helps peers after finishing a class assignment. |  |  |  | \_\_\_/3 |
| TOTAL POINTS: | \_\_\_/24 |