MAHARISHI INTERNATIONAL UNIVERSITY

CS 435

Algorithms:

Discovering the Hidden Dynamics of Natural Law

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Maharishi International University is an Equal Opportunity Institution.

ALGORITHMS:
Discovering the Hidden Dynamics of Natural Law

Professor Prem Nair, PhD

SYLLABUS

"**Fulfillment is structured in achievement, Achievement is structured in action, Action is structured in thinking, Thinking is structured in knowledge, Knowledge is structured in consciousness**."

—Maharishi

GOAL OF THE COURSE

Gain practical knowledge on design and analysis of algorithms.

COURSE OBJECTIVES, ACTIVITIES, AND ASSESSMENT

This is what you'll learn to do	This is how you'll learn it	This is what will show you've learned it
Read code and explain what the result of its execution would be (3, 5)	By paying attention to all examples and illustrations presented in the class	Homework, Midterm, Final
Distinguish between different algorithms (3, 5)	By writing and analyzing algorithms for various problems	Homework, Midterm, Final
Establish complexity classes (3, 5)	By doing lab work in the class by exploring resources available in the internet	Homework, Midterm, Final
Design an algorithm using known design principles (3, 5)	By doing lab work in the class by exploring resources available in the internet	Homework, Midterm, Final
Organize data to fit known data structures (3, 5)	By doing lab work in the class by exploring resources available in the internet	Homework, Midterm, Final
Create Java programs development environment using Eclipse (3, 5)	By doing lab work in the class by exploring resources available in the internet	Homework
Explain the connections between the Science of Consciousness And Essentials of Programming (2)	By summarizing each day's lesson in text and illustrating through an example	Short essay exam question

The numbers between parentheses refer to the main Essential Learning Outcomes (ELOs) below (in boldface) that are addressed by each learning objective:

1. Holistic development of consciousness and health
2. **Consciousness-Based understanding**
3. **Creative thinking and critical thinking**
4. Communication
5. **Scientific and quantitative reasoning**

6. Collaboration and leadership
7. Sustainable local and global citizenship

OFFICE HOURS, CONTACT INFORMATION

Dr. Prem Nair — Email: pnair@miu.edu

Phone: 472-7000 ext 2215 (office) — Office: McLaughlin Bldg., Room 226

Office hours: M/Tu/W/Th/F 9:00 – 10:00 in class

RECOMMENDED DAILY SCHEDULE

The daily schedule of all courses is designed to give students mastery of specific fields of knowledge and to cultivate higher states of consciousness for success and fulfillment in life. I recommend that you aim to be in bed by 10 PM, so that you are rested and fresh in the morning. If you have not finished your homework by then, then instead of staying up late to finish it, get a good night's rest and finish your homework in the morning before class.

MORNING	
	Group practice of the Transcendental Meditation and TM-Sidhi programs
10:00 AM – 12:05 AM	Class lecture, discussion, activities, labs
12:05 – 12:10	Stretch break
12:10 – 12:30	Group meditation
12:30 – 1:40 PM	**Lunch and walk**
AFTERNOON	
1:40 – 2:45 PM	Continuation of morning class. Problem solving.
2:45 – 2:50 PM	Stretch break
2:50 – 3:15 PM	In-class group practice of the Transcendental Meditation program for Meditators and Rising Sidhas
3:15 – 4:15 PM	Continuation of Problem Solving.
EVENING	
	Dinner
7:30 – 9:00 PM	Homework
9:30 PM	Rest

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	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
Analysis Techniques and Sorting Algorithms	**Lesson 1**: Introduction to Algorithms.	**Lesson 2A** Intro to Analysis of Algorithms.	**Lesson 2B** Divide and Conquer **Lesson 3A** Dynamic Programming	**Lesson 3** (continued)	**Lesson 3B** Exhaustive Search **Lesson 4** Average Case Analysis	**Lesson 5** Merge Sort
Analysis of Data Structures	**Lesson 6** QuickSort and QuickSelect	**Lesson 7** Lower Bound on Comparison-Based Algorithms, Bucket Sort, Radix Sort. Skip List	**Lesson 8** A Review of Data Structures **Lesson 9**: Binary Search Trees Dictionary.	**Midterm Review**	Midterm Examination **(Lessons 1-9)**	Catch up or Review
Graph Algorithms	**Lesson 10** Red-Black Trees Ordered Dictionary.	**Lesson 11** Priority Queues and Heap Sort	**Lesson 12** Introduction to Graph Theory.	**Lesson 13** Implementing Graph Algorithms	Lesson 14 Weighted Graphs, Part I: Shortest *Path Algorithms.*	**Lesson 14** Weighted Graphs, Part II Continued. Kruskal's Algorithm.
Hard Problems	**Lesson 15** NP Complete Problems.	Catch up or Review	Final Exam Review	Final Examination **(Lessons 1-15)**		

EVALUATION PLAN

Grading components

Midterm Examination	45%
Final Examination	45%
Assignments	10%

Meaning of grades

A (92–100)	Excellent, exceptional
A- (90–91.9)	Excellent
B+ (88–89.9)	Very good comprehension of course concepts and proficiency in course competencies
B (82–87.9)	Good comprehension of course concepts and proficiency in course competencies.
B- (80–81.9)	basic comprehension of course concepts and proficiency in course competencies
C (70–79.9)	Fair — meets minimal expectations for passing
NC (below 70)	No credit — did not attain course objectives at a minimal level

If you are caught cheating on midterm or final, you will get NC.

Study pods

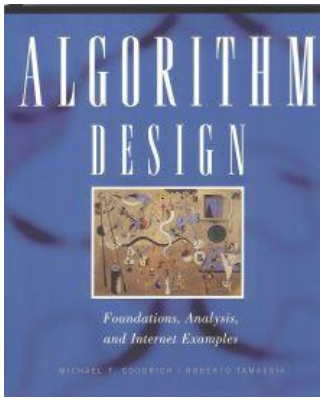
Each one of you belongs to a study pod consisting of at most 3 students. **Only one member of the study pod needs to submit the assignments. We will form the pod the very first day our class.**

Exam grading

1 point questions: Correct 1. No partial credit.
2 or more points questions: First error -50%. Subsequent errors -25%.

TEXTS AND OTHER CLASS MATERIALS

The strongly recommended text for the course is *Algorithm Design: Foundations, Analysis, and Internet Examples,* by Michael Goodrich and Roberto Tamassia, available through Amazon Books and Barnes and Noble.



Reference Materials

Data Structues And Algorithm Analysis In Java
Mark Allen Weiss
Addison-Wesley
ISBN: 0-201-35754-2
We have used this textbook in previous Algorithms classes.

An Introduction to Algorithms
T.H. Cormen, C.E. Leiserson, R.L. Rivest
McGraw-Hill, 25th printing, 2000
The classic reference. It has everything in it. And it's inexpensive considering it spans more than 1000 pages.

Data Structures, Algorithms, and Applications in Java
Sartaj Sahni
McGraw-Hill
http://www.mhhe.com/engcs/compsci/sahnijava/
Website offers Java code for many algorithms

END OF COURSE EVALUATION

Please give us your feedback about the course. You should be receiving an email from Dr. Raul Calderon at evaluations@miu.edu near the end of the course that will give you a one-step login link. If you do not get this email, you can also go to Smartevals.com/miu and log in there.

- Your Username: your student ID in 000-00-0000 format.
- Your Password: your birth date in MM/DD/YY format.

COURSE POLICIES

The following list of policies is meant to remind you of the policies in effect for this course. Most of these are University-wide policies explained in more detail in the University catalog, available online at www.miu.edu/catalog. If you are unsure how the policy works, feel free to discuss it with me after class.

Late homework (department policy) — Unless you are ill or prevented from turning in work by a family emergency, all assignments should be handed in on the day they are due. You may turn in homework one day late for a slightly reduced grade, but not after that. Please do not turn in assignments after the end of the course without prior arrangement (see "Incompletes" below).

Punctuality and attendance — Much of the value of a university class lies in the experience you have in class. For this reason, punctuality and attendance are highly valued at MIU. A class grade will be reduced at the rate of one percentage point for every 20 cumulative minutes late (up to two points per session), and three percentage points for an unexcused absence for a whole session (morning or afternoon).

NOTE: If you arrive late, please mark the number of minutes late on the Lateness Registry that is posted in the classroom.

Punctuality also extends to returning from the class break in a timely fashion (after 5 minutes). I should not need to go out and round up students.

An excused absence is defined as absence due to bona fide illness or family emergency. You are responsible for all readings and all written assignments whether you are able to attend class or not, and, in the interest of efficiency, please arrange to find out adjustments in assignments and

other announcements from other classmates rather than from me if possible. I will be happy to give you any handouts you missed while absent.

Repeated unexcused absences are a violation of the MIU. Code of Student Behavior. In addition to academic consequences, students with repeated unexcused absences are subject to disciplinary actions.

Contact me — In the rare event you must miss class or are sick, please contact me as soon as possible using the contact information above (email or phone) or send a message or note to class with a friend. If you keep me informed, I will know how you are doing and how to plan for each class.

Incompletes — Incompletes are given in response to student requests for work that cannot be completed during the course due to illness or family emergency and that does not exceed the equivalent of six sessions of a four-week course. If circumstances should arise during the course that make you eligible for an incomplete before the end of the course, please contact me immediately.

If I give you an Incomplete, you will have the three days during the weekend immediately following the end of the course to make up that incomplete work. (If you are still sick that weekend, you may request an additional 32 days — that is, the work will be due by the end of the three-day weekend following the next block. If you are granted this incomplete, yet the work is not completed by then, the grade of Incomplete will become a grade of NC.)

Academic Honor Code — Personal integrity, honesty, and honor are essential qualities of a capable student and a developing leader. The University has established an Academic Honor Code that sets forth the standards of academic honesty and personal integrity expected of all students for all writing assignments and exams. This course will be conducted in strict conformity with the Academic Honor Code. you can find the Code and related procedures in the University Catalog at www.miu.edu/catalog. Please familiarize yourself with this code and avoid using others' work without proper citations.

Standards of appearance — The MIU faculty seek to create a coherent, focused, and dignified atmosphere on campus and in the classroom that supports the giving and gaining of knowledge. I ask that you dress in keeping with this purpose. This means:

- Neat, dignified, and modest clothing appropriate to the occasion is encouraged at all times.
- Torn, stained, and sloppy clothing are not appropriate.
- Immodest or revealing clothing is not appropriate (e.g., mini-skirts).

- Shorts are not appropriate for class, but shorts (other than short shorts) may be worn in the dining hall or while doing class projects outside the classroom when appropriate as determined by the faculty.
- Students from other cultures and traditions are welcome to wear traditional dress, provided the appearance is neat and modest.

Computers, cell phones, and pagers — Please turn off all cell phones and pagers at the start of class, so you will not inadvertently interrupt a lecture or class discussion. *Carrying on extended texting conversations in class is both inappropriate and distracting to your classmates, so please avoid these kinds of behavior.* We will discuss when and under what conditions classroom use of computers is encouraged.

Student Support Services — Beyond the normal support you will receive from me and your classmates, extensive on-campus support services are available for both academic and personal support that you may need at any time. To access these services, please stop by the Student Life Department in Room 105 of the Dreier Building between 10 a.m. and 4 p.m., Monday through Friday, or call Santoria Rush at 641-472-1225 for referral to the appropriate person.

Promoting Respectful Classroom Interaction — Maharishi University of Management is unique for the level of harmony and mutual support that exists on campus and in its classrooms. In this spirit, we honor cultural diversity as well as diverse backgrounds and viewpoints. While we welcome dialog from, and challenge to, all points of view, we ask that you maintain an open and supportive attitude toward your fellow classmates and University staff, and we do not tolerate harassment in any form.