



JOHNS HOPKINS

WHITING SCHOOL
of ENGINEERING

Syllabus
Applied Mathematics and Statistics 550.472/672

Graph Theory
Spring, 2016
(4 credits, Q)

Description Study of systems of “vertices” with some pairs joined by “edges”. Theory of adjacency, connectivity, traversability, feedback, and other concepts underlying properties important in engineering and the sciences. Topics include paths, cycles, and trees; matchings and coverings, graph colorings, planarity, random graphs, routing problems associated with Euler and Hamilton. Attention directed toward problem solving, proof based mathematical thinking and algorithms. One or more topics taken up in greater depth.

Prerequisites

No formal prerequisites. Familiarity with the basic notions of the following will be helpful.
Linear Algebra (EN.550.291 or AS.110.201 or AS.110.212)
Probability (EN.550.420 or equivalent)

Instructor

Amitabh Basu, basu.amitabh@jhu.edu, <http://www.ams.jhu.edu/~abasu9/>
Office: Whitehead 202A, 410-516-4883
Office hours: Fridays 10:30–12:30 pm and by appointment. Email me to schedule an appointment outside the listed hours. Office hours will be in the instructor’s office: Whitehead 202A.

Teaching Assistant

Elizabeth (Lizard) Reiland, ereiland@jhu.edu
Office hours: Elizabeth’s office hours are on Mondays, 3–5pm, in Whitehead 212.

Meetings

Lectures: Monday, Wednesday, Friday, 9:00–9:50 am, Whitehead 304.
Discussions: Thursday, 10:30 - 11:20 am, Shaffer 301.

Textbook

Required: Introduction to Graph Theory by Douglas B. West, 2nd Edition; ISBN 81-7808-830-4.

Other useful textbooks (but not required):

Graph Theory by J.A. Bondy and U.S.R. Murty; Graduate Texts in Mathematics 244; ISBN 978-1-84628-969-9.

Graph Theory by Reinhard Diestel, 4th edition; Graduate Texts in Mathematics ISBN 978-3-64214-278-9.
Online (electronic) version(s) of this book are available at <http://diestel-graph-theory.com>.

Online Resources

Course webpage: http://www.ams.jhu.edu/~abasu9/AMS_550-472-672_Spring16.html
Blackboard will be used for posting grades.

Course Objectives

The main goal of this course is to introduce the basic notions and techniques of graph theory. Emphasis will be on structural results, although many important algorithms for graphs will be covered.

Course Topics

I plan to cover most parts of Chapters 1, 2, 3, 4, 5, 6 and Sections 8.5 and 8.6 from the Douglas West textbook. A detailed lecture-by-lecture schedule or topics can be found here: http://www.ams.jhu.edu/~abasu9/AMS_550-472-672/schedule16.html.

Course Expectations & Grading

There will one take home Midterm and an in-class 3 hour Final exam. In addition, there will be weekly GRADED homework assignments.

Homework problems will be assigned after every lecture. Every WEDNESDAY, you will be have to hand in 4-6 problems from the HW problems assigned over the previous week (i.e., the Monday, Wednesday and Friday of the previous week). These problems that you hand in will be graded, and will count towards your final grade in the quarter. I will announce which problems to hand in on the previous Friday. In case I decide that no assignments need to be handed in on a particular Wednesday, I will announce this well in advance. The HW problems will appear here on the course webpage: http://www.ams.jhu.edu/~abasu9/AMS_550-472-672_Spring16.html.

The lowest of your HW scores will be dropped before computing the final grade.

Key Dates

The Midterm will be posted on the course webpage by Tuesday, March 15, 2016 (noon). It will be due back Friday, March 18, 2016 at the beginning of class.

Final Exam will be open book. It will be in class on Wednesday, May 11, 2016 from 9am-12pm.

Assignments & Readings

See the course webpage: http://www.ams.jhu.edu/~abasu9/AMS_550-472-672_Spring16.html for weekly HW assignments.

Ethics

The strength of the university depends on academic and personal integrity. In this course, you must be honest and truthful. Ethical violations include cheating on exams, plagiarism, reuse of assignments, improper use of the Internet and electronic devices, unauthorized collaboration, alteration of graded assignments, forgery and falsification, lying, facilitating academic dishonesty, and unfair competition.

In addition, the specific ethics guidelines for this course are:

- (1) You may discuss HW problems with your fellow classmates. However, you have to write your own final solutions without looking at anyone else's solutions.
- (2) MIDTERM RULES:
 - You are not allowed to discuss any problem with another human being (this includes your classmates, of course), except Dr. Basu.
 - You can use a computer only as a word processor; in particular, you cannot consult the internet in regards to this midterm. You CAN use any other resource like the textbook, your notes, books from the library.
 - You CAN cite any result we have mentioned in class or from the HWs without proof. If you cite a result (e.g., from a book) that was NOT mentioned in class, you should include a complete proof of this fact.
- (3) FINAL RULES:
 - You are not allowed to discuss any problem with another human being (this includes your classmates, of course), except Dr. Basu.

- You can use a computer only as a word processor; in particular, you are not allowed to access the internet during your final. You CAN use any other resource that you bring with you to the final like the textbook, your notes, HW solutions, books from the library.
- You CAN cite any result we have mentioned in class or from the HWs without proof. If you cite a result (e.g., from a book) that was NOT mentioned in class, you should include a complete proof of this fact.

Report any violations you witness to the instructor.

You can find more information about university misconduct policies on the web at these sites:

- Undergraduates: e-catalog.jhu.edu/undergrad-students/student-life-policies/
- Graduate students: e-catalog.jhu.edu/grad-students/graduate-specific-policies/

Students with Disabilities

Any student with a disability who may need accommodations in this class must obtain an accommodation letter from Student Disability Services, 385 Garland, (410) 516-4720, studentdisabilityservices@jhu.edu.

ABET Outcomes

- Ability to apply mathematics, science and engineering principles.
- Ability to identify, formulate and solve engineering problems.
- Understanding of professional and ethical responsibility.
- Ability to communicate effectively.