

**CEM 653 CONSTRUCTION SCHEDULING AND RESOURCE
OPTIMIZATION**

University of Nevada, Las Vegas
Civil and Environmental Engineering and Construction Department

Course Information:

Semester: Fall
Lecture Day:
Lecture Time:
Lecture Location:
Credit Hours: 3

Instructor Information:

Instructor:
Email:
Office:
Phone:
Office Hours:

Catalog Description:

Scheduling and resource optimization. Includes short-interval scheduling, Gantt charts, linear, and matrix scheduling formats. Network techniques including CPM and PERT concepts and calculations. Computer applications. Two hours' lecture and three hours' laboratory.

Prerequisites:

Graduate standing.

Required Skills:

Proficient in mathematics and excel software.

Students Learning Outcomes (SLO):

Student will be able to:

- Explain fundamental concepts of scheduling processes.
- Explain broad concepts and topics of construction scheduling.
- Explain a process for creating and maintaining reliable schedules
- Describe and create work breakdown structures
- Describe various types of activity relationships
- Determine activity durations
- Describe a critical path
- Calculate network schedules.
- Understand problems with resource constraints and apply basic techniques of resource allocation and leveling to scheduling.

- Explain the differences among a recovery schedule, an updated schedule, and as-built schedule
- Explain the 4D, 5D, and 6D.
- Explain the earned value concept and the status of the project in terms of the schedule and the budget
- Explain linear scheduling and develop a linear schedule for a project
- Explain PERT and compute the probabilities of completing the project in certain date by using PERT technique.
- Apply electronic-based technology to manage the construction process
- Create construction project schedules.
- Create oral presentations appropriate to the construction discipline.

Instructional Methods:

This course will be conducted in a lecture (remotely – synchronously) and laboratory (in person) format. Class lectures are premised on familiarity with assigned readings. Therefore, class material will not necessarily replicate assigned reading material, and both will be covered on exams. Students are responsible for reading the appropriate material before it is covered in lecture. Additionally, it is recommended that students bring their copy of the text and other reading materials to each lecture (used as a reference). Specifically, when the instructor is covering textbook material, students are expected to have their textbooks with them in class.

Course Topics:

The following topics will be covered in the course. The following listing is a general indication of the order of their coverage. However, I reserve the right to change the order of coverage and the topics to be covered based upon the class's performance and interests.

- Module 0: Introduction of Course
- Module 1: Introduction to Construction Scheduling (Chapter 1)
- Module 2: Developing a network model (Chapter 2)
- Module 3: Precedence diagrams (Chapter 3)
- Module 4: Determining activity durations (Chapter 4)
- Module 5: Resource allocation and resource leveling (Chapter 6)
- Module 6: Computer scheduling (Chapter 9)
- Module 7: Schedule Quality Metrics (Dr. Choi's material)
- Module 8: Project monitoring and control (Chapter 8)
- Module 9: Earned value (Chapter 10)
- Module 10: PERT: Program Evaluation and Review Technique (Chapter 15)
- Module 11: Linear scheduling (Chapter 14)

Course Requirements: Students will engage in the following activities:

- Attend class (missed classes will be subtracted from your final grade in the class)
- Read assigned material prior to class sessions

- Participate in class discussions
- Complete homework
- Complete class assignments
- Complete major examinations
- Complete a term project

Required and/or Recommended Books and Materials:

- Text Book: *Construction Planning and Scheduling, 4th edition* by Jimmie W. Hinze, Pearson, 2012
- Recommended Reference Books: *RS Means; GAO (2015), Schedule Assessment Guide (Best Practices for Project Schedules*

Assignment Weights:

Grade components will be weighted as follows in the computation of the final course grade:

- Participation and Attendance: 5%
- Homework Assignments: 24% (8 HWs*3%)
- Quizzes: 6% (6 lab quizzes*1%)
- Midterm Exam: 25%
- Final Exam: 30%
- Semester Project: 10%

Grading Scale:

Letter Grade	Score Range	Subjective Criteria
A	≥ 90%	Superior knowledge
B+	≥ 87%	Good knowledge
B	≥ 84%	Good knowledge
B-	≥ 80%	Good knowledge
C	≥ 70%	Minimum knowledge
D	≥ 60%	Did not meet minimum knowledge standards
F	Below 60%	Did not meet minimum knowledge standards

Extra Credit Assignment Options:

Professor, at his sole discretion, may or may not provide students with an opportunity to complete extra credit test or assignments.

Homework:

All the homework should be submitted through the canvas in PDF or Word files. No hard copies will be accepted. Homework will be due at the commencement of the specified class period. Assignments must be submitted before or when due even if the student will be absent from class on the due date. Assignments with spelling, grammatical, or mechanical errors—or with obvious erasures, cramped margins, coffee stains, etc.—will be downgraded.

When sources are used to complete assignments students are expected to cite the sources. Students should use the ASCE version of citations. More information can be found at <http://www.asce.org/Audience/Authors,--Editors/Books/General-Book-Information/Author-Date-References/>

Communication Skills:

Communication skills are paramount to a successful career. Therefore, communication skills, written and oral, will be evaluated in all coursework. Lengthy and major assignments involving significant writing will have writing as 30 percent of their evaluation criteria. The laboratory part of this course will include the report writing. To get more help about writing you may access at: <http://writingcenter.unlv.edu/>

Examinations:

Examinations will be closed book and closed notes. Missed examinations will count as zero if prior authorization is not granted. Make-up examinations will be given under **extraordinary** circumstances only. No make-up examinations will be given beyond one week (7 days) after the original exam date regardless of reason. Make-up examinations will cover material similar to the original exam, but may be of a different format and different composition of types of questions.

The final exam will be comprehensive. (TBD)

Late Policy:

NO late homework or tests.

Class Attendance Policy:

Class attendance is vital for student and professor communication and learning. Attendance is mandatory. Because many of our students are employed, the Construction Management faculty has established a policy that considers the needs of our students. This policy allows for some **authorized** absences. However, no more than **NINE** employment-related excused absences will be allowed. An absence is defined as missing a one 50-minute or one 1-hour and 15-minute lecture, or one 3-hour laboratory. Employment-related absences require an official letter from the employer's human resources department (**NO EXCEPTIONS** – a note from your project manager is not acceptable). The letter must be on official company letterhead and signed by the human resources department manager. At the instructor's sole discretion employment-related absences may be independently verified with the human resources department. If your human resources manager will not provide the necessary documentation then the absence is unexcused. Medically-excused absences must be accompanied by an official document written by a physician. More than **NINE** or more unauthorized class absences will result in a failing grade. **The student is personally** responsible for acquiring the information missed as a result of an absence, excused or otherwise. If you miss class for any reason, you are still responsible for the material and

content of the class and for any assignment given for the next class. Also, assignments must be submitted when due even if the student will be absent from class on the due date. Students who are not present for the entire class period or who are unprepared for class may also accrue absences. Late arrivals, early departures, and class sessions for which you are unprepared are all considered equivalent for grading purposes. Religious holidays and university activities are covered in a later section.

Disclaimer:

The contents of this document are to be considered “tentative” and subject to change as the instructor deems necessary.

UNIVERSITY POLICIES

Public Health Directives

Face coverings are mandatory for all faculty and students in the classroom. Students must follow all active UNLV public health directives while enrolled in this class. [UNLV public health directives](https://www.unlv.edu/coronavirus/health-requirements) are found at <https://www.unlv.edu/coronavirus/health-requirements>. Students who do not comply with these directives may be asked to leave the classroom. Refusal to follow the guidelines may result in further disciplinary action according to the [UNLV Code of Student Conduct](https://www.unlv.edu/sites/default/files/page_files/27/StudentConduct-Code.pdf), https://www.unlv.edu/sites/default/files/page_files/27/StudentConduct-Code.pdf, including being administratively withdrawn from the course.

Academic Misconduct

Academic integrity is a legitimate concern for every member of the University community. We all share in upholding the fundamental values of honesty, trust, respect, fairness, responsibility, and professionalism. By choosing to join the UNLV community, students accept the expectations of the Student Academic Misconduct Policy, and are encouraged to always take the ethical path whenever faced with choices. Students enrolling at UNLV assume the obligation to conduct themselves in a manner compatible with UNLV’s educational mission. An example of academic misconduct is plagiarism. Plagiarism is using the words or ideas of another person, from the Internet or any other source without proper citation of the source(s). See the [Student Conduct Code](https://www.unlv.edu/studentconduct/student-conduct), <https://www.unlv.edu/studentconduct/student-conduct>.

Auditing Classes

Auditing a course allows a student to continue attending the lectures and/or laboratories and discussion sessions associated with the course, but the student will not earn a grade for any component of the course. Students who audit a course receive the same educational experience as students taking the course for a grade, but will be excused from exams, assessments, and other evaluative measures that serve the primary purpose of assigning a grade.

Classroom Conduct

Students have a responsibility to conduct themselves in class and in the libraries in ways that do not interfere with the rights of other students to learn, or of instructors to teach. Use of devices such as cellular phones and pagers, or other potentially disruptive activities are only permitted with the prior explicit consent of the instructor. Students are specifically prohibited to record classes without instructor authorization, including online/remote classes (either audio only, or video and audio). The instructor may rescind permission at any time during the class. If a student does not comply with established requirements or obstructs the functioning of the class, the instructor may initiate an administrative withdrawal of the student from the course.

Since the COVID-19 pandemic forced some instruction to be delivered remotely starting in Spring 2020, numerous students have asked instructors to record their synchronous classes, so that they can access them at their convenience. Instructors who agree to record their classes (audio only, or video and audio) should inform students in advance. Recorded lectures may not be broadly released to anyone, but made available exclusively to those students enrolled in the class during the particular academic term. Recorded lectures must be stored securely, and are subject to the Nevada System of Higher Education's Records Retention Policy, meaning that the recordings can only be deleted 120 days after the end of class (i.e., after grades are posted). Once this requirement is met, the recordings should be deleted. Class recordings are protected from disclosure, as they are deemed part of an educational record under the Family Educational Rights and Privacy Act (FERPA).

Copyright

The University requires all members of the University Community to familiarize themselves with, and to follow copyright and fair use requirements. You are individually and solely responsible for violations of copyright and fair use laws. The University will neither protect nor defend you, nor assume any responsibility for employee or student violations of fair use laws. Violations of copyright laws could subject you to federal and state civil penalties and criminal liability, as well as disciplinary action under University policies. Additional [copyright policy information](https://www.unlv.edu/provost/copyright) is available at <https://www.unlv.edu/provost/copyright>.

Disability Resource Center (DRC)

The [UNLV Disability Resource Center](https://www.unlv.edu/drc) (Student Services Complex, SSC-A, Room 143, <https://www.unlv.edu/drc>, telephone 702-895-0866) provides resources for students with disabilities. Students who believe that they may need academic accommodations due to a permanent disability, temporary or permanent medical need, or academic support due to pregnancy are encouraged to contact the DRC as early as possible in the academic term. A Disabilities Specialist will discuss what options may be available to you. Students who are already registered with the DRC should request their accommodations online each semester, and make an appointment to discuss their accommodations with their instructors.

Final Examinations

The University requires that final exams given at the end of a course occur on the date and at the time specified in the Final Exam schedule. The Final Exam schedule is typically available at the start of the semester, and the classroom locations are available approximately one month before the end of the semester. See the [Final Exam Schedule](https://www.unlv.edu/registrar/calendars), <https://www.unlv.edu/registrar/calendars>.

Identity Verification in Online Courses

All UNLV students must use their Campus-issued ACE ID and password to log in to WebCampus-Canvas.

UNLV students enrolled in online or hybrid courses are expected to read and adhere to the [Student Academic Misconduct Policy](https://www.unlv.edu/studentconduct/misconduct/policy),

<https://www.unlv.edu/studentconduct/misconduct/policy>, which states that “acting or attempting to act as a substitute for another, or using or attempting to use a substitute, in any academic evaluation or assignment” is a form of academic misconduct. Intentionally sharing ACE login credentials with another person may be considered an attempt to use a substitute, and could result in investigation and sanctions, as outlined in the Student Academic Misconduct Policy.

UNLV students enrolled in online courses are also expected to read and adhere to the [Acceptable Use of Computing and Information Technology Resources Policy](https://www.it.unlv.edu/policies/acceptable-use-computing-and-information-technology-resources-policy),

<https://www.it.unlv.edu/policies/acceptable-use-computing-and-information-technology-resources-policy>, which prohibits sharing university accounts with other persons without authorization.

To the greatest extent possible, all graded assignments and assessments in UNLV online courses should be hosted in WebCampus-Canvas or another UNLV-managed platform that requires ACE login credentials for access.

Incomplete Grades

The grade of “I” (Incomplete) may be granted when a student has satisfactorily completed three-fourths of course work for that semester/session, but cannot complete the last part of the course for reason(s) beyond the student’s control and acceptable to the instructor, and the instructor believes that the student can finish the course without repeating it. For undergraduate courses, the incomplete work must be made up before the end of the following regular semester. Graduate students receiving “I” grades in 500-, 600-, or 700-level courses have up to one calendar year to complete the work, at the discretion of the instructor. If course requirements are not completed within the period indicated, a grade of “F” will be recorded, and the student’s GPA will be adjusted accordingly. Students who are fulfilling an Incomplete grade do not register for the course, but make individual arrangements with the instructor who assigned the “I” grade.

Library Resources

Librarians are available to consult with students on research needs, including developing research topics, finding information, and evaluating sources. To make an appointment with a subject expert for this class, please visit the [Libraries' Research Consultation](https://guides.library.unlv.edu/appointments/librarian) website, <https://guides.library.unlv.edu/appointments/librarian>. You can also [ask the library staff](https://ask.library.unlv.edu/) questions via chat and text message at <https://ask.library.unlv.edu/>.

Missed Classwork

Any student missing class, quizzes, examinations, or any other class or laboratory work because of observance of religious holidays will be given an opportunity during that semester to make up the missed work. The make-up opportunity will apply to the religious holiday absence only. It is the responsibility of the student to notify the instructor within the first 14 calendar days of the course for Fall and Spring courses (except for modular courses), or within the first 7 calendar days of the course for Summer and modular courses, of their intention to participate in religious holidays which do not fall on state holidays or periods of class recess. For additional information, please visit the Missed Work policy, under Registration Policies, on the [Academic Policies](https://catalog.unlv.edu/content.php?catoid=29&navoid=7326) webpage, <https://catalog.unlv.edu/content.php?catoid=29&navoid=7326>.

In accordance with the policy approved by the Faculty Senate regarding missed class time and assignments, students who represent UNLV in any official extracurricular activity will also have the opportunity to make up assignments, provided that the student provides official written notification to the instructor no less than one week prior to the missed class(es).

The spirit and intent of the policy for missed classwork is to offer fair and equitable assessment opportunities to all students, including those representing the University in extracurricular activities. Instructors should consider, for example, that in courses which offer a "Drop one" option for the lowest assignment, quiz, or exam, assigning the student a grade of zero for an excused absence for extracurricular activity is both contrary to the intent of the Faculty Senate's policy, and an infringement on the student's right to complete all work for the course.

This policy will not apply in the event that completing the assignment or administering the examination at an alternate time would impose an undue hardship on the instructor or the University that could be reasonably avoided. There should be a good faith effort by both the instructor and the student to agree to a reasonable resolution. When disagreements regarding this policy arise, decisions can be appealed to the Department Chair/School Director, College/School Dean, and/or the Faculty Senate Academic Standards Committee.

For purposes of definition, extracurricular activities may include, but are not limited to: academic recruitment activities, competitive intercollegiate athletics, fine arts activities, liberal arts competitions, science and engineering competitions, and any other event or

activity sanctioned by a College/School Dean, and/or by the Executive Vice President and Provost.

Rebelmail

Rebelmail is UNLV's official email system for students and by University policy, instructors and staff should only send emails to students' Rebelmail accounts. Rebelmail is one of the primary ways in which students receive official University communications, information about deadlines, major Campus events, and announcements. All UNLV students receive a Rebelmail account after they have been admitted to the University. Emailing within WebCampus-Canvas is also acceptable.

Tutoring and Coaching

The Academic Success Center (ASC), at the Claude I. Howard Building, provides tutoring, academic success coaching, and other academic assistance for all UNLV undergraduate students. For information regarding tutoring subjects, tutoring times, and other ASC programs and services, please visit the [ASC website](https://www.unlv.edu/asc), <https://www.unlv.edu/asc>, or call 702-895-3177. The ASC is located across from the Student Services Complex (SSC). Academic success coaching is located on the second floor of SSC A, Room 254. Drop-in tutoring is located on the second floor of the Lied Library, and on the second floor of the College of Engineering building (TBE A 207).

UNLV Writing Center

One-on-one or small group assistance with writing is available free of charge to UNLV students at the [Writing Center](https://writingcenter.unlv.edu/), <https://writingcenter.unlv.edu/>, located in the Central Desert Complex, Building 3, Room 301 (CDC 3-301). Walk-in consultations are sometimes available, but students with appointments receive priority assistance. Students may make appointments in person or by calling the Center, telephone 702-895-3908. Students are requested to bring to their appointments their Rebel ID Card, a copy of the instructions for their assignment, and two copies of any writing they have completed on their assignment.

Diversity Statement

As an institution of higher learning, UNLV represents a rich diversity of human beings among its faculty, staff, and students, and is committed to aspiring to maintain a Campus environment that values that diversity. Accordingly, the University supports understanding and appreciation of all members of its community, regardless of race, sex, age, color, national origin, ethnicity, creed, religion, disability, sexual orientation, gender, gender identity, marital status, pregnancy, genetic information, veteran status, or political affiliation. Please see [University Statements and Compliance](https://www.unlv.edu/about/statements-compliance), <https://www.unlv.edu/about/statements-compliance>.

A successful learning experience requires mutual respect and trust between the students and the instructor. Accordingly, the instructor asks that students be willing to listen to one another's points of view, acknowledging that there may be disagreements, keep discussion

and comments on topic, and use first person, positive language when expressing their perspectives.