

ENVS 294- W1 Green Building Design Principles and Practices

Fall 2020
Online Course

INSTRUCTOR: Farzaneh Soflaei (PhDs| Assoc. AIA| LEED Green Assoc.)

Office: 310B Milne Library

Phone: (607) 436-2118 (office)| (443)787-6781 (cell)

Virtual Office Hours: Google Hangouts by appointment

Email: farzaneh.soflaei@oneonta.edu

Website: <https://suny.oneonta.edu/geography-environmental-sustainability/faculty-staff>

Personal Website: <https://farzanehsfolaei.webs.com>

COURSE DESCRIPTION: Credits 3. Today, buildings demand 32% of the total world's energy resources, and are the major contributor to climate change, resource depletion, waste, over-consumption, diminished human health, and other 21st century problems. This is a multidisciplinary course focus on LEED® (Leadership in Energy and Environmental Design) as the most widely used green building rating system in the world, and reviews its credit categories, prerequisites, requirements, total possible points, and four (4) levels of certifications. It will equip students to understand how different benchmarks and standards for green buildings have evolved over time and how they, as green buildings leaders, can participate in the future (addressing the UN Sustainable Development 3, 6, 7, 12, 15 Goals¹). The course will use a mix of brief lectures, readings, videos, online discussions and case-based assignments to engage students more in learning and provide opportunities for them to move from consumers to creators. Successful course completion can prepare the student for LEED Green Associate exam or becoming a LEED Accredited Professional. Students who complete the course in good standing will receive funding to take the certification exam as part of their tuition.

COURSE LEARNING OBJECTIVES (CLOS):

Upon completion of this course the student will be able to:

CLO 1: Explain the significant impact of green buildings on sustainability of future cities, to reduced environmental impacts in terms of energy, water, materials, transportation, waste and the indoor air quality.

CLO 2: Describe the green building design process as a multidisciplinary team collaborates to establish common sustainable objectives, develop green ideas and work plans to achieve high performance building targets.

CLO 3: Identify LEED® (Leadership in Energy and Environmental Design) as the most widely used green building rating system in the world, and recognize LEED Green Associate credential.

CLO 4: Demonstrate the acquired skills and knowledge associated with the LEED® rating system, its main concepts, eight (8) credit categories, prerequisites, requirements, total possible points, and four (4) levels of certifications.

CLO 5: Discuss and analyze the LEED-certified projects as successful case studies, to identify green building design strategies (lessons learned) to reduce consumption of non-renewable resources, minimize waste, and create healthy productive environments (in alignment with UN SDGs).

CLO 6: Apply notions and guiding principles from science and engineering disciplines to systematically form a more complete, coherent framework of analysis that offers a richer understanding of green building design.

CLO 7: Prepare for LEED Green Associate exam or a LEED Accredited Professional.

¹ <https://sustainabledevelopment.un.org/post2015/transformingourworld>

COURSE CONTENT OUTLINE:

Module 1	Week 1: Introduction and Syllabus Review
Module 2	Week 2: Going Green: Toward a Sustainable Future
Module 3	Week 3: Green Building Design: Definitions, Goals, Principles, and Benefits
Module 4	Week 4: Evaluation of Green Buildings: LEED® Rating System, and LEED Green Associate credential.
Module 5	Week 5: Location and Transportation (LT)
Module 6	Week 6: Sustainable Sites (SS)
Module 7	Week 7: Water Efficiency (WE)
Module 8	Week 8: Energy and Atmosphere (EA)
Module 9	Week 9: Materials and Resources (MR)
Module 10	Week 10: Indoor Environmental Quality (IEQ)
Module 11	Week 11: Innovation and Design (ID) and Regional Priority (RP)
Module 12	Week 12: Case Studies: LEED-Certified Projects Review
Module 13	Week 13: Project Presentation: Green Building Performance Assessment
-----	Week 14: Thanksgiving Holiday
-----	Week 15: Wrap Up and Course Review
-----	Week 16: Final Exam (Comprehensive)

MODULE LEARNING OBJECTIVES (MLOs):

Upon completion of each module the student will be able to:

Module 1: Introduction and Syllabus Review	Week 1	<p><u>MLO 1-1:</u> Identify the negative impact of buildings on natural environment, human health and well-being. (CLO 1)</p> <p><u>MLO 1-2:</u> Explain the benefits of green buildings to reduce or eliminate negative environmental impacts by using less water, energy, and natural resources. (CLO 1, CLO 2)</p>
Module 2: Going Green: Toward a Sustainable Future	Week 2	<p><u>MLO 2-1:</u> Describe the role of buildings as the major contributor to climate change. (CLO 1)</p> <p><u>MLO 2-2:</u> Discuss the salient features of energy use and greenhouse gas emissions (GHGs), from building use and construction. (CLO 1)</p> <p><u>MLO 2-3:</u> Describe the concept of sustainable development as a complex and interconnected challenge requiring multiple perspectives and problem-solving strategies. (CLO 2)</p> <p><u>MLO 2-4:</u> Explain the UN’s Sustainable Development Goals (SDGs), and their importance for future community development. (CLO 2)</p> <p><u>MLO 2-5:</u> Highlight the benefits of green buildings to address the UN’s Sustainable Development Goals. (CLO 1, CLO 2)</p>
Module 3: Green Building Design: Definitions, Goals, Principles, and Benefits	Week 3	<p><u>MLO 3-1:</u> Define a green building according to the OFEE and EPA. (CLO1)</p> <p><u>MLO 3-2:</u> List the features of sustainable practices, and benefits of green buildings based on US GSA. (CLO1, CLO 2)</p> <p><u>MLO 3-3:</u> Express the green building design as an integrative process, in respect to the triple bottom line (TBL). (CLO 1, CLO 2)</p> <p><u>MLO 3-4:</u> Identify green building design principles including sustainable site development, water conservation, energy efficiency,</p>

		material selection, and indoor environmental quality, in alignment with SDGs, for a sustainable future. (CLO1, CLO 2)
Module 4: Evaluation of Green Buildings: LEED® Rating System, and LEED Green Associate credential.	Week 4	<p>MLO 4-1: Identify the LEED® (Leadership in Energy and Environmental Design) as the most widely-used sustainable buildings rating systems in the world. (CLO 3)</p> <p>MLO 4-2: Describe the Governing Bodies of LEED®: USGBC + GBCI. (CLO 3)</p> <p>MLO 4-3: List the LEED® rating systems, and describe their scope and structure. (CLO 3, CLO 4)</p> <p>MLO 4-4: Explain the LEED® credit categories and certification levels. (CLO 3, CLO 4)</p> <p>MLO 4-5: Identify the Green Associate credential; its benefits and the job market demand. (CLO 3, CLO 7)</p>
Module 5: Location and Transportation (LT)	Week 5	<p>MLO 5-1: Explain the intent of the Location and Transportation (LT) category. (CLO 4)</p> <p>MLO 5-2: Identify strategies for sustainable site selection. (CLO 4)</p> <p>MLO 5-3: Identify strategies for providing and encouraging the use of alternative transportation. (CLO 4)</p> <p>MLO 5-4: Understand the process for determining density around a project site. (CLO 4)</p> <p>MLO 5-6: List examples of high-priority sites. (CLO 4)</p> <p>MLO 5-7: Explain the importance of walkability in choosing a project location. (CLO 4)</p>
Module 6: Sustainable Sites (SS)	Week 6	<p>MLO 6-1: Identify site assessment strategies. (CLO 4)</p> <p>MLO 6-2: Describe site design and management strategies. (CLO 4)</p> <p>MLO 6-3: Describe rainwater management strategies. (CLO 4)</p> <p>MLO 6-4: Explain how to reduce the heat island effect of a building and the building site. (CLO 4)</p> <p>MLO 6-5: Identify strategies used to reduce light pollution. (CLO 4)</p>
Module 7: Water Efficiency (WE)	Week 7	<p>MLO 7-1: Explain the importance of EPAct of 1992 and how it has affected water efficiency. (CLO 4)</p> <p>MLO 7-2: Describe how flush and flow fixture water usage is measured. (CLO 4)</p> <p>MLO 7-3: Explain the importance of reducing indoor, outdoor, and process water use. (CLO 4)</p> <p>MLO 7-4: List the strategies to reduce indoor water use. (CLO 4)</p> <p>MLO 7-5: List the strategies to reduce outdoor water use. (CLO 4)</p> <p>MLO 7-6: Describe the benefits of water metering for water performance management. (CLO 4)</p>
Module 8: Energy and Atmosphere (EA)	Week 8	<p>MLO 8-1: Explain the environmental concerns related to energy use and the importance of reducing it. (CLO 4)</p> <p>MLO 8-2: List the main goals of the Energy and Atmosphere (EA) category. (CLO 4)</p> <p>MLO 8-3: Identify the standard used for baseline case in the energy and atmosphere category. (CLO 4)</p> <p>MLO 8-4: Explain the strategies to reduce energy demand. (CLO 4)</p> <p>MLO 8-5: Explain how to reduce the importance of building loads. (CLO 4)</p> <p>MLO 8-6: Explain the strategies to increase energy efficiency. (CLO 4)</p>

		<p><u>MLO 8-7:</u> Compare the differences between on-site renewable energy and off-site renewable energy. (CLO 4)</p> <p><u>MLO 8-8:</u> Describe renewable energy certificates and how they are used as a carbon offset. (CLO 4)</p> <p><u>MLO 8-9:</u> Explain the tradeoff dilemma of refrigerants. (CLO 4)</p> <p><u>MLO 8-10:</u> Explain the importance of measuring and verifying ongoing energy performance after the owner takes possession of the building. (CLO 4)</p>
Module 9: Materials and Resources (MR)	Week 9	<p><u>MLO 9-1:</u> Explain the importance of reusing buildings and materials to improve the material conservation. (CLO 4)</p> <p><u>MLO 9-2:</u> Explain how environmentally preferable materials influence green design. (CLO 4)</p> <p><u>MLO 9-3:</u> Identify the strategies involved in selecting environmentally preferable materials and the role of building product disclosures (CLO 4)</p> <p><u>MLO 9-4:</u> Describe the life cycle impact of materials on a project and the environment. (CLO 4)</p> <p><u>MLO 9-5:</u> Explain the importance of diverting waste from landfills. (CLO 4)</p> <p><u>MLO 9-6:</u> List the strategies that can be used to address construction and demolition waste. (CLO 4)</p>
Module 10: Indoor Environmental Quality (IEQ)	Week 10	<p><u>MLO 10-1:</u> Explain the primary goals of the Indoor Environmental Quality category. (CLO 4)</p> <p><u>MLO 10-2:</u> Identify environmental factors impacting indoor air quality. (CLO 4)</p> <p><u>MLO 10-3:</u> Identify the strategies involved in obtaining credits in the indoor environmental quality category. (CLO 4)</p> <p><u>MLO 10-4:</u> Explain the symptoms of sick building syndrome. (CLO 4)</p> <p><u>MLO 10-5:</u> List strategies to improve indoor air quality. (CLO 4)</p> <p><u>MLO 10-6:</u> Explain the strategies for improving occupant comfort and health. (CLO 4)</p> <p><u>MLO 10-7:</u> Describe strategies for improved lighting quality. (CLO 4)</p> <p><u>MLO 10-8:</u> Describe the acoustical problems of open office designs. (CLO 4)</p>
Module 11: Innovation and Design (ID) and Regional Priority (RP)	Week 11	<p><u>MLO 11-1:</u> Explain the intent of Innovation Design category. (CLO 4)</p> <p><u>MLO 11-2:</u> Identify the strategies involved in obtaining credit in the innovation category. (CLO 4)</p> <p><u>MLO 11-3:</u> Describe exemplary performance. (CLO 4)</p> <p><u>MLO 11-4:</u> Explain the intent of the Regional Priority. (CLO 4)</p> <p><u>MLO 11-5:</u> Identify the strategies involve in obtaining credit in the regional priority category. (CLO 4)</p>
Module 12: Case Studies: LEED-Certified Projects Review	Week 12	<p><u>MLO 12-1:</u> Review the LEED® certifications, and summarize their main rating criteria. (CLO 4, CLO 5)</p> <p><u>MLO 12-2:</u> Identify some of the successful LEED®-certified buildings as case studies. (CLO 5)</p> <p><u>MLO 12-3:</u> Analyze LEED®-certified project cases to extrapolate the strategies (as lessons learned) to integrate green buildings design. (CLO 1, CLO 4, CLO 5, CLO 6)</p>
Module 13: Project Presentation:	Week 13	<p><u>MLO 13-1:</u> Demonstrate the acquired skills and knowledge associated with the environmental sound strategies, to integrate in building design process for a “Green” future. (CLO 1, CLO 2, CLO 4, CLO 5, CLO 6)</p>

Green Building Performance Assessment		<p><u>MLO 13-2:</u> Identify Arc Skoru as a sustainability performance platform with tools to measure and score operational performance for buildings. (CLO 6)</p> <p><u>MLO 13-3:</u> Collect required data of an existing campus building with regard to the LEED credit categories (CLO 3, CLO 4, CLO 5, CLO 6)</p> <p><u>MLO 13-4:</u> Implement the Arc platform to input and analyze the data in order to evaluate building performance based on the LEED credit scoring system. (CLO 3, CLO 4, CLO 5, CLO 6)</p>
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REQUIRED TEXT:

1. McCombs, H.C. 2015. **LEED Green Associate Exam Preparation Guide**, LEED v4 Edition, U.S. Green Building Council, ISBN: 978-0-8269-1294-7.
- In addition to the main textbook, additional materials will be provided including: posted documents, weblinks, online articles, and videos (mostly from [USGBC](https://www.usgbc.org)², [BuildingGreen](https://www.buildinggreen.com/)³, and [LEEDuser](https://www.leeduser.com/)⁴ as online resources that are available for eLearning students).

RECOMMENDED TEXT:

1. McDonough, W., Braungart, M. 2003. **The Hannover Principles: Design for Sustainability**, 10th Anniversary Edition. William McDonough and Partners, ISBN: 978-1559636353.
2. USGBC. 2014. **LEED Core Concepts Hard Copy: An Introduction to LEED and Green Building**. U.S. Green Building Council, 3rd Edition, ISBN: 978-1-932444-32-2.
3. Montoya, M. 2011. **Green Building Fundamentals: Practical Guide to Understanding and Applying Fundamental Sustainable Construction Practices and The LEED System**, 2nd ed, Prentice Hall. ISBN: 978-0135111086.
4. Koralturk, A.T. 2016. **LEED Green Associate V4 Exam Complete Study Guide A**, 2nd Edition, LDCT Pub, ISBN: 978-0994618016

COURSE ACTIVITIES/ TEACHING STRATEGIES: The course will use a mix of brief lectures, readings, videos, films, and other instructional strategies for online courses such as virtual field trips and guided tours to engage students more in learning and provide opportunities for them to move from consumers to creators. **Students are required to take one (1) exam, seven (7) self-assessment quizzes, and five (5) assignments** in different types of questions, project, etc. **Four (4) online discussion forums and Wikis** are also designed to as a part of class, to encourage students to explore a topic in detail and exchange ideas on green building design and LEED rating system. Students are required log in to the Blackboard to access the provided materials and follow the instructions of each module on weekly basis.

ADDITIONAL UNIQUE ASPECTS OF COURSE:

1. **Addressing the UN’ Sustainable Development 3, 6, 7, 12, 15 Goals**⁵, this interdisciplinary course focuses on the established and emerging principles of green buildings and construction, and test strategies for their implementation in design practice; **as green buildings leaders in the future**.
2. With a focus on **LEED® (Leadership in Energy and Environmental Design)** credit categories, points, rating prerequisites and credit requirements, and green buildings certification process, it prepares students to sit for the LEED Green Associate exam for becoming a **LEED Accredited Professional**.
3. This course highlights the **mission of department of geography and environmental sustainability at SUNY Oneonta**, to “give students the geographic and/or environmental sustainability knowledge

² <https://www.usgbc.org/articles>

³ <https://www.buildinggreen.com/>

⁴ <https://leeduser.buildinggreen.com/>

⁵ <https://sustainabledevelopment.un.org/post2015/transformingourworld>

and skills they need to interpret social, physical and environmental influences at local, regional and global scales”⁶. It encourages students to consider sustainable design as an integral part of everyday life, to reduce greenhouse gas emissions, energy and resource consumption while showcasing SUNY Oneonta’s commitment to sustainability.

4. This course also fulfills the **SUNY General Education attributes NS3** to help students to “understand the methods scientists use to explore natural phenomena, including observation, hypothesis development, measurement and data collection, experimentation, evaluation of evidence, and employment of mathematical analysis; and application of scientific data, concepts, and models in one of the natural sciences”.⁷

COURSE REQUIREMENTS:

GENERAL REQUIREMENTS:

- **Course Format:** This course is delivered completely online asynchronously (so you will need consistent, reliable access to the Internet) via Blackboard. The tools that are part of Blackboard (grading, information posting, emails, etc.) will be used for administration and general communication. A discussion board will be the primary tool for interaction within the class. Microsoft Office, Adobe Acrobat, Google Earth, etc. will be used to develop and view materials as well as demonstrate concepts being discussed or presented. Media to be used will include digital documents, video and audio. The media will be a combination of instructor developed material as well as material available in print or web based. The tools and media are selected in conjunction with each course module and the associated learning objectives. Course components include online material, multimedia, threaded discussions and e-mail. This course is primarily **asynchronous** (not “real time”); please keep in mind that each module is designed to be completed within the designated timeframe and will include specific "due dates" for each part of the module's assignments.
- **Attendance Policy:** Success in this course is dependent on your active participation and engagement throughout the course. You need consistent, reliable access to the Internet via Blackboard, as it delivers online using an asynchronous (not “real time”) format. As such, students are required to complete all assignments by the due date, and to actively participate in class discussions. Additionally, students are expected to:
 - Log on at least three times a week – on different days in order to completely weekly assignments, assessments, discussions and/or other weekly deliverables as directed by the instructor and outlined in the syllabus;
 - Participate in the weekly threaded discussions, this means that, in addition to posting a response to the thread topic presented, students are expected to respond to each other and comment and questions from the instructor and/or other students;

If you find that you cannot meet the class' minimum discussion requirements due to such a circumstance, please contact your instructor as soon as possible. Students will not be marked present for the course in a particular week if they have not posted on the discussion forum and/or submit assignment/essay or complete assessment if administered in that week.

SPECIFIC REQUIREMENTS:

1. **Exams/Quizzes:** There will be **one (1) exam** (see the attached course schedule for the exam dates). In addition, there will be seven **(7) self-assessment quizzes**. Quiz material will be drawn from the previous discussions and assigned readings. Exam/quizzes will consist of a mix of multiple choice, true/false, and short answer questions about the material covered in that unit.
2. **Discussions/Forums:** Students are required to participate in four **(4) online discussion forums and Wikis** as a part of class, **to explore a topic in detail and exchange ideas**. Attendance by way of online participation is considered in the calculation of the student’s final grade, as each activity is assigned a

⁶ <https://suny.oneonta.edu/geography-environmental-sustainability>

⁷ <https://suny.oneonta.edu/academic-advisement/general-education>

value and is counted toward the student's final grade. The instructor reserves to issue a failing grade for lack of online presence in this course.

3. **Homework Assignments:** Students are required to conduct five **(5) assignments**. All assignments should be completed independently unless they are specifically indicated as a team assignment by your instructor (directions for the homework assignments and group assignments will be made available on Blackboard). Students are expected to complete all assigned readings prior to each class; these may include materials supplemental to the textbook posted on Blackboard. Students must always properly cite their sources and properly credit all words, thoughts and images to the original author. Students are also responsible for completing all assignments by due dates and times. Due dates will be announced when the assignment becomes available on the Blackboard calendar. You have to submit your assignments in Microsoft Word or PDF format using the Blackboard Assignment tool (digital drop boxes) on Blackboard (please plan ahead in case there are technical difficulties) unless there are extenuating circumstances, **emailed papers will not be accepted.**

*****NOTE:** I always aim to have assignments graded within a week of the due date, often sooner. If you don't see a score within a week, please check to make sure it was received. DO NOT WAIT until the end of the semester to check. To iterate, I will not accept missing material or reconsider missing grades after the final class.

LATE ASSIGNMENT/ MAKE-UP TEST POLICY: All assignments must be submitted online on Blackboard on the due date announced unless otherwise noted by the instructor. If you cannot submit work on time, let me know beforehand and we'll make alternate arrangements. Unexcused late work will only be accepted for up to one week after the due date, with reduced credit.

METHOD OF EVALUATION & BASIS OF FINAL COURSE GRADE DETERMINATION:

Assessment Methods:

- Professor will regularly interact with the students through discussion forums, and provide feedback validating their understanding of the fundamental course material delivered through posted readings and videos and posts, papers and projects presented by other students. Discussions will be evaluated utilizing an associated Discussion Board Participation rubric and assigned points for each discussion forum.
- Posted module assignments will be discussed and critiqued by the professor and other students. The student will be evaluated utilizing an associated Written Assignment Assessment rubric and assigned points for each assignment.
- Self-assessment quizzes will be provided in seven modules to assist the student in assessing their understanding of the reading assignments. All quizzes are graded items and their weights are indicated in the course.

*****NOTE:** All rubrics and their associated assessment criteria will be available to the student.

Course Grading: Your final letter grade is determined on a **percentage-based scale**. Please don't assume that percentages from other classes guarantee a particular final grade in this class. You can track your progress throughout the semester by adding up points you've earned out of the total possible.

Course Grading:		Total Percentage
Final Exam (Comprehensive)	25%	25%
Self-assessment quizzes	7@5% each	35%
Assignments and Project	5@5% each	25%
Discussion forums and Wiki Participation	4@3.75%	15%
Total		100%

Distribution: The distribution of your final grade will be based on the following:

A 90-100 B 80-89 C 70-79 D 60-69 F Below 60

Please do not email to ask if I will give you extra points or if you can complete missing assignments or extra credit after grades are posted (especially since I am required to submit final grades to the Registrar within 48 hours of the exam).

STUDENTS WITH DISABILITIES: All individuals who are diagnosed with a disability are protected under the Americans with Disabilities Act, and Section 504 of the Rehabilitation Act of 1973. As such, you may be entitled to certain accommodations within this class. If you are diagnosed with a disability, please make an appointment to meet with Accessibility Resources, 133 Milne Library, ext. 2137. All students with the necessary supporting documentation will be provided appropriate accommodations as determined by the Accessibility Resources Office. It is your responsibility to contact Accessibility Resources and concurrently supply me with your accommodation plan, which will inform me exactly what accommodations you are entitled to. You will only receive accommodations once you provide me with an Accessibility Resources accommodation plan. Any previously recorded grades will not be changed.

ACADEMIC INTEGRITY: You are expected to know and abide by SUNY Oneonta’s Academic Integrity Policy⁸. Plagiarism in any form—including copying and pasting text from websites or other materials without using quotation marks and/or referring to information without properly crediting sources—will not be tolerated. If you unethically copy the work of another student or outside source, you will receive NO CREDIT for the entire assignment.

COURSE SCHEDULE:

Module	Topic	Task to Complete	Due Date
Week 1 (8/24-8/30)	Introduction and Syllabus Review	W1_Ice Breaker (DB)	8/27
		W1_Discussion Board	8/30
Week 2 (8/31-9/6)	Going Green: Toward a Sustainable Future	W2_Assignment	9/6
Week 3 (9/7-9/13)	Green Building Design: Definitions, Goals, Principles, and Benefits	W3_Discussion Board	9/10
		W3_Assignment	9/13
Week 4 (9/14-9/20)	Evaluation of Green Buildings: LEED® Rating System, and LEED Green Associate credential.	W4_Assignment	9/20
Week 5 (9/21-9/27)	Location and Transportation (LT)	W5_Assignment	9/24
		W5_Quiz	9/27
Week 6 (9/28-10/4)	Sustainable Sites (SS)	W6_Quiz	10/4
Week 7 (10/5-10/11)	Water Efficiency (WE)	W7_Quiz	10/11
Week 8 (10/12-10/18)	Energy and Atmosphere (EA)	W8_Quiz	10/18
Week 9 (10/19-10/25)	Materials and Resources (MR)	W9_Quiz	10/25
Week 10 (10/26-11/1)	Indoor Environmental Quality (EQ)	W10_Quiz	11/1
Week 11 (11/2-11/8)	Innovation and Design (ID) and Regional Priority (RP)	W11_Quiz	11/8

⁸ <http://www.oneonta.edu/development/judicial/code.pdf>

Week 12 (11/9-11/15)	Case Studies: LEED-Certified Projects Review	W12_Discussion Board (Wiki)	11/15
Week 13 (11/16-11/22)	Project Presentation: Green Building Performance Assessment	W13_Assignment (Project)	11/22
Week 14 (11/23-11/29)	Thanksgiving Holiday	No Class	-----
Week 15 (11/30-12/6)	Wrap Up and Course Review	-----	12/4
Week 16 (12/7-12/13)	Final Exam (Comprehensive)	-----	12/13

*DB: Discussion Board Participation