

Active Learning 101

A Starting Point for Engaging Teaching

ACTIVE LEARNING COMMUNITY



Welcome!

Congratulations on your willingness to learn more about an exciting approach to teaching. Active learning has the potential to greatly impact how students learning by improving the way students engage with content, their fellow students, and faculty.

This booklet is a companion to Active Learning 101 sessions offered throughout the year and is an introductory guide to utilizing active learning methods at Rutgers-New Brunswick. It seeks to expose you to the pedagogic principles, instructional materials, learning spaces, and technology that can help you best utilize active learning.

While Active Learning 101 is designed to be an entry point, there are various resources available through the Active Learning Community to help you continue the development of your teaching, including workshops, networking opportunities, Symposiums, and more.

Thank you and welcome to the Community,

- ▶ **Alice Seneres**
Director of Integrated Support, Rutgers Learning Centers
- ▶ **Chris Morett**
Director, Scheduling & Space Management
- ▶ **Dave Wyrzten**
Associate Director for Faculty Training & Outreach, Digital Classroom Services
- ▶ **Mary Emenike**
Assistant Professor, School of Arts & Sciences
- ▶ **Stacey Blackwell**
Senior Director, Rutgers Learning Centers

Table of Contents

Pedagogy	3
Active Learning Background.....	3
Activity Design.....	4
Practitioner Tips.....	10
Rutgers Resources	14
Important Information	15
Appendix	16
Sample Flipped Course Plan	16
Flipped Course Plan Template.....	17

Pedagogy

Active Learning Background

Active learning is a growing approach to teaching that seeks to expand the classroom experience beyond the lecture. While there are as many definitions of active learning as there are faculty utilizing it, a good starting point is to view it as any approach to teaching that goes beyond students passively receiving information. Active learning requires students to think about concepts, apply them, check their understanding, explain ideas, and engage in ways that can result in better understanding of and a more developed ability to work with class content. At the same time, working with fellow students to discuss ideas, complete tasks, and solve problems teaches students valuable professional and life skills.

Research has shown that active learning, when compared to individualistic learning, improves academic achievement, the quality of interpersonal interactions, self-esteem, and perceptions of greater social support.¹ Students in Active Learning Classrooms outperform their peers in traditional classrooms and their own grade expectations as predicted by test scores.²

Active learning can take many forms from simple Q&A and polling to cooperative learning, problem-based learning, case methods, simulations, peer instruction, group discussion, self-assessment, think-pair-share, brainstorming, writing, and role playing.



The process of utilizing active learning is often incremental, involving trial and error. This book seeks to provide you with a starting point with which you can begin to think about ways of utilizing active learning in your course.

¹ Price, M. [2004] "Does Active Learning Work? A Review of the Research." *J. Engr. Educ.* 93[3], 223-231

² Walker, Brooks, Saichaie, and Petersen (2016) *A Guide to Teaching in the Active Learning Classroom: History, Research, and Practice*. Sterling, Virginia: Stylus Publishing

Activity Design

Prepared by Ismael Lara, Dena Novak, and Jennifer Obando of the Teaching and Learning with Technology Team.

There are a wealth of activities available to you to enhance your course, whether you are teaching in an active learning classroom or not. The below activities are grouped based on Bloom's Taxonomy of Learning Domains. There are six domains, and each has been grouped into pairs below. For example, when you want students to simply recall a fact or theory (which falls under the Remembering or Understanding Learning Domains), a lecture check is one activity that would be appropriate. Similarly, there are activities listed for the Applying or Analyzing domains, and the Evaluating or Synthesizing domains.

Remembering/Understanding

Lecture Check

1. After about 15 to 20 minutes of lecture, project a question for the class to see. This may be a multiple choice item that is similar to the type of question that will be used on an exam.
2. Students vote for the response they think is correct using clickers (or hand-raising, etc).
3. If most of the students have the correct response, the instructor simply continues with the course material. If, however, more than approximately 20% choose the incorrect response, the instructor has students turn to their neighbor and convince them of the correct choice.
4. Finally, the instructor goes through the items again to see how many choose each alternative. If an unacceptable number still have incorrect responses, it may be wise to go back over the material.
5. Bonus: Students also can be called on to defend the selection they have made.

Quiz Tournament

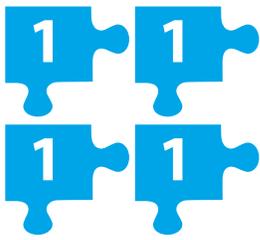
1. Divide the class into two or more groups of 4-6 and announce a competition for most points on a practice test.
1. Let them study a topic together for a set amount of time and then give that quiz, tallying points.
2. After each round, let them study the next topic before quizzing again.
3. The points should be carried over from round to round, and the winning group may receive a small number of extra credit points. The student impulse for competition will focus their engagement onto the material itself.
4. Variation: This can also be done over the course of a semester rather than in a single class period. Keep students in the same groups for the duration of the ongoing tournament to increase competition and make it easier to tally points.

Ask the Winner

1. Ask students to silently solve a problem individually at their seats, or on white boards around the room if in an Active Learning Classroom.
2. After revealing the answer, instruct those who got it right to raise their hands (and keep them raised).
3. Then, all other students are to partner with someone with a raised hand to better understand the question and how to solve it next time.
4. If time allows, give a second practice problem, this time for students to solve together in their partner groups.
5. Instruct students to have the student who missed the first problem take the lead on solving the new problem, explaining their steps as they go, with the student who solved the first problem acting as coach.

Jigsaw

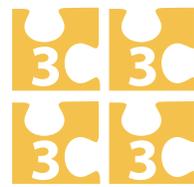
1. Give each group a different topic to investigate, discuss, or research. These will be the “expert” groups. Inform students that each group member should be prepared to report out on the group’s findings.
2. After a set amount of time spent in the “expert” groups, create new groups. Each new group should have one “expert” on each of the original topics.
3. Each “expert” now has to teach his new group the topic he or she focused on in the first part of the activity.
4. This activity is especially efficient for covering larger amounts of information in a relatively short time, over 1-2 class periods.



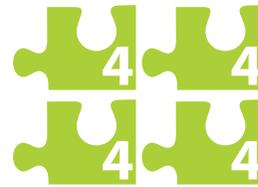
Team 1



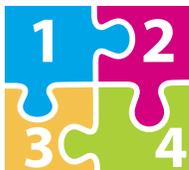
Team 2



Team 3



Team 4



Mixed Group A



Mixed Group B



Mixed Group C



Mixed Group D

Taboo Game

1. One student faces the class. Behind him/her, a word is written that the rest of the class can see.
2. The objective is for the class to shout words or concepts related to the word on the board and eventually get the student to guess the word.

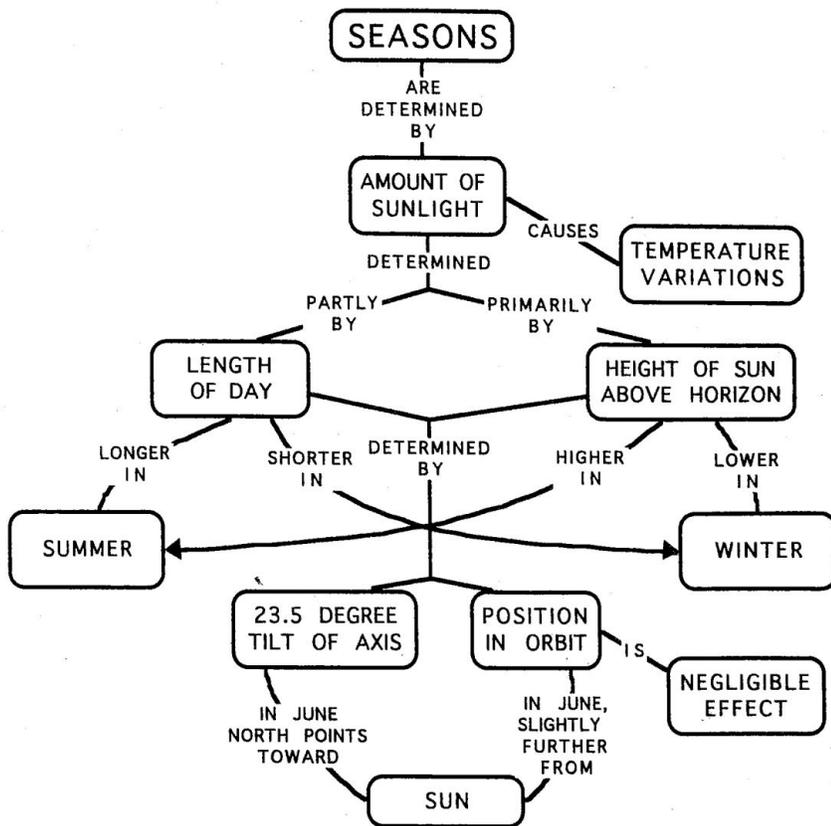
Pause Procedure (plus variations!)

1. Pause procedure involves pausing for 1-3 minutes after every 15-20 minutes of lecture. This time can be used for a variety of tasks, including, review, discussion, and/or as classroom assessment opportunities. Several variations are below:
 - a. Note Comparison: Take a break for 2-3 minutes to allow students to compare their class notes so far with other students, fill in gaps, and develop joint questions.
 - b. Minute Paper: Students write for one minute, responding to a specific question, or summarizing the main points from the previous chunk of lecture.
 - c. Muddiest Point: Like the Minute Paper, but asks for the “most confusing” point
 - d. Responses can also be compiled using tools like PollEverywhere or the LMS.

Applying/Analyzing

Concept Mapping

1. Create a focus question that clearly specifies the issue that the concept map should address, such as “What are the potential effects of cap-and-trade policies?” or “What is materials science?”
2. Tell students (individually or in groups) to begin by generating a list of relevant concepts and organizing them before constructing a preliminary map.
3. Students may be asked to start from scratch, or you may give them a partially completed map where they need to fill in information.
4. Encourage students to create maps that:
 - a. Employ a hierarchical structure that distinguishes concepts and facts at different levels of specificity
 - b. Draw multiple connections, or cross-links, that illustrate how ideas in different domains are related
 - c. Include specific examples of events and objects that clarify the meaning of a given concept.



A concept map showing the key ideas needed to understand why we have seasons. Many people fail to understand the effect of the inclination of the earth on its axis as the primary cause for summer and winter in both hemispheres.

Where in the World

1. Students search the Internet for a real-world example that makes use of concepts/ideas from class, either in-class or for homework.
2. Debrief either by submitting to an online discussion, sharing using Active Learning Classroom monitors and/or microphones, or use responses to frame discussion for next class.

Pass the Problem

1. Divide students into groups.
2. Give the first group a case or a problem and ask them to identify (and write down) the first step in solving the problem or analyzing the case (3 minutes).
3. Pass the problem on to the next group and have them identify the next step.
4. Continue until all groups have contributed.

Picture Prompt

1. Show students an image (photo, graph, diagram, cartoon, etc.) with no explanation, and ask them to identify/explain it, and justify their answers. Alternatively, ask students to write about it using terms from lecture, or to name the processes and concepts shown.
2. Students may work on this individually and then share in small groups. Or, they may begin individually/in small groups and then share as a whole class.
3. After students have explored all options, give students the “right answer” (or your expert insight) and use this to frame discussion.

Polar Opposites

1. Ask the class to examine two written-out versions of a theorem (or corollary, law of nature, etc.), where one is incorrect, such as the opposite or a negation of the other.
2. In deciding which is correct, students will have to examine the problem from all angles.
3. Follow with a group or whole-class discussion in which students explain their reasoning.

Evaluating/Synthesizing

A Wrench in the Gears

1. Give a set amount of time to work on a problem, case study, or situation individually, in pairs, or in small groups.
2. After students have begun developing a strategy, introduce one or more challenges (the “wrenches”) that add new data, complications, or mitigating factors to the case.
3. Students discuss the problem again (pairs or small groups), focusing on revising their original assumptions or conclusions.

Brain Drain

Divide students into groups of 5 or 6. Hand out to each student an empty grid with a prompt or task at the top to brainstorm, 5-6 rows (one for each group member) and 3-4 columns. Each row represents a brainstorming round. Each column represents a distinct component of the focus issue.

1. Each person brainstorms possible answers in row one, filling in each of the columns in that row with their response to the prompt.
2. After three minutes, rotate papers clockwise. Each student works on the same problem in row 2, without repeating any answers from row 1.
3. Continue until sheet is filled in, with each progressive round generating more creative responses to the original issue.
4. After the entire sheet is completed, groups debrief to find the best answers and optionally present to the rest of the class.

ISSUE: Develop a plan to clean up the local park, determining how you will gather the human resources needs, the financial resources needed, and how you will publicize your project.

Round	Human Resources	Financial Resources	Publicity
1	Volunteers from local high school	Bake sale	Flyers posted in public spaces
2			
3			

Pick the Winner

1. Divide the class into groups and have all groups work on the same problem and record an answer/strategy on paper.
2. Then, ask groups to switch with a nearby group, and evaluate their answer.
3. After a few minutes, allow each set of groups to merge and ask them to select the better answer from the two choices, which will be presented to the class as a whole.

Build From Restricted Components

1. Provide limited resources (or a discrete list of ideas that must be used) and either literally or figuratively dump them on the table
2. Ask students in groups to construct a solution using only these things
3. If possible, provide “red herrings”, and ask students to construct a solution using the minimum amount of items possible.

Six Degrees of Separation

1. Provide groups with a conceptual start point and challenge them to leap to a given concept in six moves or fewer.
2. One student judge in each group determines if each leap is fair and records the nature of the leaps for reporting back to the class.

Student Generated Test Questions

1. Challenge groups of students to create likely exam questions and model the answers.
2. Students then submit them for you or a TA to review
3. The best student-generated questions can later be distributed to the class as a study guide.
4. Variation: same activity, but with students in teams, taking each others' quizzes

An online summary of activities is available at
<https://dcs.rutgers.edu/active-learning/teaching-tools/activities>.

Practitioner Tips

Using active learning can require you to rethink some of the things that are taken for granted as obvious in a more lecture-based class. The below list includes some of these more common issues that can arise along with solutions recommended by members of the Active Learning Community and practitioners at other institutes of higher learning.

Assessment

How to grade students is one of the most common and difficult issues faced by practitioners of active learning. Traditional assessment tools like exams and quizzes may not accurately test the knowledge developed in class and may not properly reflect the in-class contributions of the student.

When designing assessment tools for your class, consider why you are grading the student: to evaluate their understanding of concepts, to provide feedback to you or them on that understanding, to measure their effort, to motivate, etc. Then, consider various modes of assessment - tests, quizzes, projects, presentations - based on how they meet those objectives.

Classroom Management

Organizing students in groups or teaching in an active learning classroom with no front depends the way we typically navigate learning spaces. The following tips can help you address these challenges and leverage the benefits of these spaces:

- If students change seats frequently, have students place name cards in front of them wherever they sit so that you can call students by name. DCS Active Learning Classrooms have whiteboard tents that can be used for this purpose.
- Use Learning Assistants or other in-class help. Assistants have been used to moderate groups or roam large classrooms to interject where necessary.
- In larger classrooms, it may be hard for students to hear each other across the room. Larger Active Learning Classrooms are equipped with table-top microphones that students can use to participate. In addition to providing amplification, asking that students use the microphones to participate can also help moderate discussions and ensure that students are not trying to speak over one another. For lecture halls, consider requesting a CatchBox throwable microphone from Digital Classroom Services that can be tossed to participating students.
- When it is time to end group work and focus on the instructor, consider utilizing a phrase - such as “eyes on me,” “let’s come back together” - that can serve as a signal to stop talking.

Difficulty Covering Entire Subject

Some faculty find that spending more time on group work requires that they cover less topics. Instead, they focus on covering fewer topics in more depth, and often find this to be a worthwhile trade off. However, you can also devote more class time to active learning by utilizing means of content delivery that occur out of class, such as requiring reading or watching a pre-recorded lecture. See the Appendix for a Sample Flipped Course Plan.

At the same time, some instructors find that active learning actually helps them cover more content. The increase in student feedback enables these instructors to move more quickly through topics that are easily understood.

Regardless of the effect on your class, you can expect that the use of active learning will require you to adjust both the breadth and depth of content covered in the classroom.

Distractions

While the use of active learning can create a dynamic learning experience, it can also create distractions. The din of group work, the use of multiple instructor and student monitors, and the lack of one focal point at the room's front can be distracting. Consider these suggestions to mitigate distraction:

- Direct student's attention where it needs to go. For example, tell students "now I'd like to direct your attention to the whiteboard, the screen, etc...."
- Ask students to put down or temporarily close their electronic devices or unshare images from group monitors. You can also shut down or blank room displays yourself.
- Ask for quiet in the room when it is time to work individually or reflect on a topic.
- Because the shuffling of papers can be distracting, rather than handing out individual papers, create folders for each group and ask them to remove handouts as they are necessary.
- If a student is distracted or engaging in distracting behavior, move towards or stand near them.
- Ask students early in the semester if they have identified distractions that need to be minimized.
- Walk behind students to discourage them from inappropriate use of laptops and phones.

Less Control Over Content Covered in Class

When giving a presentation, you are in control how much time is spent on a topic. Many active learning techniques are designed to follow the needs of students in real time. As a result, discussion may be less controlled. However, many instructors find that the questions posed in their active learning questions are much more insightful, often because the more obvious questions were asked and answered within groups.

Loss of Class-Wide Engagement

Focusing too much on the use of small groups can cause an instructor to miss the opportunity to explore the diversity of ideas in the entire class. While small groups are typically the best way to foster focused, productive group work - you can also set aside opportunities for a moderated, full-class discussion. One way to structure such discussions is to have students start off considering an idea in their groups and then have groups report out to the whole class, potentially building off the initial prompt with another question. You may also design activities in which students have to interact with students in other groups.

No “Front” of the Room

Unlike traditional classrooms which have direct sight lines to the instructor, board, and screen at the front of the room, Active Learning Classrooms have various focal points - not all of which are viewable by every student. As a result, some students may need to turn to view the instructor or presentation material, making it hard to take notes. At the same time, instructors may find that not all students are able to see them at the same time. The following suggestions can help you adjust to this unusual layout:

- Active Learning Classrooms are designed to facilitate collaboration and group work. Rather than designing a class plan that requires that your entire class look at the same focal point, consider building in group work where students interact at the group level.
- Explain to your students that due to the design of the room, there will be times when you will have your back towards them. Encourage them to turn or even move their seats if they need to. Explain that the room is designed that way to aid the group work they will be doing.
- Make an effort to stand in different locations throughout the room so that students get equal face time. Direct students to the current area of interest, such as a monitor, a board, or yourself and telegraph when the focal point will change.
- Instead of writing on a board, use the document camera and send the image to the room displays so students can more easily see and take notes.
- Teach using a portable device such as a tablet connected to the room displays wirelessly so you can move around room while teaching. Visit the Solstice page for more information on wireless display sharing in DCS classrooms: <https://dcs.rutgers.edu/solstice>.
- Use Teaching Assistants or Learning Assistants to distribute help throughout the room.

Student Expectations

Active learning can run counter to what a student might expect out of a college class. Communicating the class expectations and the rationale for using active learning are key.

- Notify students how the class will use active learning as early as possible, ideally in the course description and definitely in the syllabus. Explain the different types of activities that will be utilized and what type and level of participation will be expected of students.

- Early in the semester, devote time to discussing the broad aims of the course and how active learning is central to those goals. For example, discuss how students will develop their ability to analyze concepts, utilize their knowledge, and work collaboratively. Tie active learning to the development of skills that will help students in school and in their future careers.
- When setting up specific activities, explain the reasons for using them and what students are expected to learn.

Students Who Don't Want to Interact

Some students are reluctant or unwilling to interact with their fellow students.

The following approaches can help:

- Early in the semester set expectations for student-instructor and student-student interaction, including:
 - if students should raise their hand or use a microphone to talk to the entire class,
 - if students should develop guidelines for discussing potentially hot-button issues,
 - explain your rationale for these expectations.
- Indicate that the class will require student involvement in the course description so that students who are not comfortable contributing know this before registering.
- Cold call on students, but - to aid those that are less comfortable with cold calling - allow them to confer with their group if they need help.

Traditional Seating

Having students engage in group work in rooms with traditional furniture can be difficult. Configuring rooms for group seating can be chaotic and time consuming. There are several steps you can take to minimize the disruption to your class when reconfiguring rooms for group seating:

- Instruct students to form groups when they arrive to the room, so that the students are already in group seating for the start of class.
- Project a diagram of the group assignments and seat configurations required for an activity to minimize confusion. You can share the diagram a few minutes before it will be time for students to move so that they understand it in advance of moving their seats.
- Assign students to seats in a “typical” row configuration. Based your group assignments on having students near each other cluster so that group formation is less chaotic.

Unproductive Groups

Some groups may have a hard time remaining on task and working towards the learning outcomes you envision. Fostering good group work requires some management by the instructor, including the following examples:

- Use ice breakers following the formation of groups so that students feel comfortable interacting with their peers.
- Consider the impact of how you form groups on the work product of these groups. View our Forming Groups web page for more information.
- Create a mechanism for groups to collectively and individually assess how they and their peers are performing. This will create accountability, reflection, and stress the importance of cooperative work.
- Have students create a contract that defines group members roles and expectations.
- Define roles, such as notetaker, for each group member.

Rutgers Resources

There are several units at Rutgers-New Brunswick that are available to aid your use of active learning. In addition to these areas, the Active Learning Community is available to help connect you with the tools you need to succeed in your class.

Digital Classroom Services

<https://dcs.rutgers.edu>

DCS designs, installs, and supports the use of **classroom technology** in Rutgers-New Brunswick's general-purpose classrooms. Their office can help you use existing classroom technology and introduce you to additional solutions.

Rutgers Learning Centers

<https://rlc.rutgers.edu/>

In addition to supporting student learning, the RLC acts as a resource for faculty and staff who are interested in learning new instructional strategies or developing additional methods of support for their students. Especially relevant to active learning at Rutgers, the RLC co-runs the **Learning Assistant Program**, which trains and provides students to undergraduate courses. Learning Assistants help in the classroom in several ways, including facilitating discussions and workshops during lectures, team teaching recitation or laboratory sections with a graduate teaching assistant, or independently leading supplemental study groups. They have been used in active learning classes in many ways, including managing and facilitating group work.

Teaching and Learning with Technology Team

<https://tlt.rutgers.edu/>

The Teaching and Learning with Technology Team works with Rutgers faculty and staff to support the use of educational technology in face-to-face, blended, and online courses.

Instructional Designers work with Rutgers faculty to support the use of educational technology and sound pedagogical principles to design face-to-face, blended, and online courses. The Teaching and Learning with Technology Team can meet with you one-on-one and help you **evaluate your course goals and design solutions**, whether it is a course revision or wholesale redesign. The Teaching and Learning with Technology Team also supports the use of teaching technologies that can be used beyond the classroom to enhance student learning.

Scheduling & Space Management

<https://scheduling.rutgers.edu>

Beyond scheduling Rutgers-New Brunswick courses, SS&M also oversees the use of the general-purpose **classrooms**. Scheduling Officers can help you identify spaces that make sense for the use of active learning in your class, from Active Learning Classrooms to seminar rooms and group study spaces.

Important Information

Active Learning Web Site

Visit <https://activelearning.rutgers.edu> to learn more about:

- Active Learning Spaces at Rutgers-NB and how to request them.
- Teaching Tools, including information on forming groups, creating activities, and much more.
- News and updates including information on active learning spaces, faculty development programs.
- Upcoming events such as workshops and technical training.
- And much more...

Active Learning Community Leadership

- Stacey Blackwell, *Senior Director, Rutgers Learning Centers*
- Mary Emenike, *Assistant Professor, School of Arts and Sciences*
- Chris Morett, *Director, Scheduling and Space Management*
- Alice Seneres, *Director of Integrated Academic Support, Rutgers Learning Centers*
- Dave Wyrzten, *Associate Director for Faculty Training and Outreach, Digital Classroom Services*

Appendix

Sample Flipped Course Plan

Flipping a course typically involved providing content delivery out of class time so that class time can be used for activities that reinforce those concepts. Below is one example of how to plan a flipped course.

Day of Week:	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Instruction Type:	Passive Out of Class	Active F2F Meeting	Breather Day	Active F2F Meeting	Passive Out of Class		
Students do:	<p>Students do: By now students should have spent 2.5 hours viewing lectures.</p> <p>By end of tonight they will post a reflection about what they understood best/worst.</p> <p>Formative Assessment & Accountability.</p>	<p>Students work through Challenge Questions in groups or independently.</p> <p>Students volunteer to share answers as we discuss as a class.</p> <p>Correct answers are formulated as an entire class.</p>		<p>Students use the information from that week in creative and novel Group-Based ways.</p> <p>On-the-fly presentations.</p> <p>Movie trailer production.</p> <p>Clicker-based activities.</p> <p>Case studies.</p> <p>Mind maps, (aka flow charts).</p> <p>Role playing activities, (mock trials).</p> <p>End of class Quiz.</p>	<p>Complete readings for next week and view lectures/lecture materials online.</p>		
Instructors do:	<p>Grade reflections and provide feedback before Monday F2F meeting.</p>	<p>“Office Hours in Class” Review common concerns mentioned in reflections on-the-fly. No new material!</p> <p>Provide study/challenge questions and facilitate/coach individual or group work.</p>		<p>Engaging, fun, information-intensive activities that are graded for effort.</p> <p>Revisit the material during class time.</p> <p>Reminder- Online lectures should become available to students after</p>	<p>Prep for next week.</p>		

Flipped Course Plan Template

Day of Week:	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Instruction Type:							
Students do:							
Instructors do:							



RUTGERS
UNIVERSITY | NEW BRUNSWICK