Getting Results

MODULE 2:
Planning for Outcomes

Learn what your students should be able to do in the workplace and connect these expectations to your course goals.

Table of Contents
MODULE 2: Planning for Outcomes

Section 1: Introduction and Intended Outcome

I. Preface

Of all the tasks expected of a teacher, one of the most important is planning. A well-thought-out course eliminates confusion and helps you and your students focus on what matters most. Whether you are starting from scratch or teaching an established curriculum, this module will help you design a course that focuses on real-life outcomes**.**

Intended Outcome for This Module

As a result of this module, you should be able to envision students in the jobs for which they are preparing. You should be able to design courses that help them learn the skills, issues, and concepts they will need to succeed.

II. Module Overview VIDEO

Watch this video to see how a group of teachers plan their courses to reinforce program goals and prepare students for real-life job experiences.

> **V Video Note**
> At this point in the module, please view the **Planning for Outcomes** video. This video is available on the *Getting Results* course Web site at www.league.org/gettingresults or on the CD-ROM, available from the League (www.league.org).

Think About

What are the primary factors these teachers have taken into consideration when planning their courses? How does planning alongside other teachers contribute to a coherent curriculum?

V More about the class in the video

The teachers in this video are full-time faculty members in the Natural Resources Technology program at Mt. Hood Community College. Joan DeYoung teaches a Forest Measurements course, Kate Holleran teaches an Aerial Photo Interpretation course, and Walter Shriner teaches Mammal Biology and Techniques.

Now think about your own courses and planning.

Notebook

List three ways you currently plan. Now think about how you could link your course to other courses students take. How might you link your content to the content of the other courses?

Section 2: Thinking About Outcomes

I. Planning

One of the biggest changes to occur in contemporary teaching is a shift in planning. Previously, teachers planned their activities, and then thought about what the goals of the course would be. We now know that effective planning starts with the course outcome. That is what the students should be able to do outside the classroom with the information that they have learned. Once the outcome has been determined, the teacher then selects appropriate activities.

When thinking about planning for outcomes, you need to consider:

- The current demands of industry and any certification standards
- How you can link your course goals with the larger program goals
- How you can plan your course based on the intended outcomes
- How you can create lessons that will lead the students toward the desired outcome

Good planning includes connections among courses, but what's more important is what happens in your course. As you proceed through this module, you will look at each aspect of planning carefully and discover how to effectively plan for outcomes.

Envisioning Outcomes

If learning means engaging in a task that builds personal capacity for the rest of life, then curriculum design doesn't begin in the classroom at all. Curriculum design begins outside the classroom with one important question: "What do my students need to be able to DO 'out there' (in the rest of life) that we are responsible for in this classroom?" It's a simple question; seeing the answer is more difficult.

If I am creating a course in information technology, I begin by envisioning what my students will DO differently in the community, the workplace, or the family as a result of this course. It is only after I am able to articulate this in a few clear and agreed-upon outcome statements that I can decide what content is necessary and how competence will be assessed.

Excerpted from Stiehl and Lewchuk, 2002.

II. Envisioning Students in Real-Life Work Roles

Although you probably have some very definite ideas about what you would like your students to know and be able to do at the end of your course, you also need to consider:

- The demands of the industry for which you are preparing students
- Skill standards for your industry
- Learning standards in place for your program

Many students enter technical programs with specific career goals in mind. You can help these students focus on what they need to succeed in the workplace.

Take a few moments and imagine your students in the kinds of jobs for which they are preparing. What will they need to be able to do? What skills, knowledge, and behavior will be expected of them as they perform their jobs?

Notebook
Write down an initial list of ideas, focusing on three or four broad outcomes you see as most important in your industry.

Now refine your list. You might:

- Talk to others in your field who can give you new perspective on the kinds of things students should know and be able to do in order to succeed in the workplace.
- Do some research. Even if you've been working in the industry for 20 years or more, your outlook may be limited by the particulars of your company or situation.
- Talk to your college program director or department chair about whether your program has industry partners.
- Determine the industry expectations for students who graduate by attending or reading the minutes from an industry advisory board meeting.
- Search help-wanted ads in a local newspaper or online job bank. If your students are preparing for jobs as chemical plant technicians, for example, help-wanted ads will list sample skills. A class assignment could have students find ads and review them together.

III. Preparing for Industry VIDEO

Watch this video to see how two teachers prepare their students for jobs in biotechnology.

V Video Note

At this point in the module, please view the **Preparing for Industry** video. This video is available on the *Getting Results* course Web site at www.league.org/gettingresults or on the CD-ROM, available from the League (www.league.org).

Think About

How do these teachers structure their classes to prepare students for future careers?

V More about the class in the video

Leslie Barber and Deb Audino teach biotechnology at New Hampshire Community Technical College. After a basic introduction to molecular biology, students work for several weeks in the laboratory, collecting data and writing detailed lab reports. This mimics what students should be able to do in the workplace and gives them hands-on research opportunities.

In preparing students for jobs in industry, it's important to consider not only the industry-specific content knowledge and technical skills they will need to succeed, but general workplace behaviors, such as working in a team or producing a well-written report.

Notebook

What behaviors are important in your workplace? How might you model those in your classroom?

IV. Considering Skill Standards

Skill standards outline the kind of work to be performed on a job. Many industries have developed skill standards to help clarify workplace expectations so that workers understand how to perform and advance in their field, students know what knowledge and abilities they need to get a job, and educators can ensure that their curriculum matches workplace requirements.

Skill standards tend to be minimum competencies for today's jobs and are often specific to an industry, technology, or even a type of equipment. Simply learning skill standards is not enough for students to be competitive in the workplace. They need to adapt to new technologies and information.

V. Aligning with Program Outcomes

It is important to align your course outcomes with those of your department or degree program. Check with your department chair to see what program standards exist for your course and how you need to incorporate them into your class.

If you are teaching a class in genetic fingerprinting, for example, you may need to teach students about the molecular structure of DNA, or they may have already learned about that in an earlier class. Some disciplines allow teachers more flexibility, while others have more prescribed learning outcomes for each class, possibly because they are prerequisites for more advanced courses.

Even if you receive little direction from your program chair, it's a good idea to talk to others in your program to ensure that you aren't duplicating their efforts or leaving major gaps in students' knowledge.

If your teaching schedule prohibits you from talking to your colleagues in person (you teach at night, for example, and they teach during the day), try e-mailing or at least asking for a copy of their course syllabi to learn the major topics they are teaching.

This process is likely to be especially helpful for instructors teaching general education courses, such as mathematics, where connections to workplace or program goals may be overlooked.

Speaking to instructors of higher-level courses in a few of your students' majors can help you determine how to add context to your subject and will ensure that your students receive a coherent learning experience as they advance through their programs.

If you are unable to talk to your colleagues, try doing your own research to determine the context in which your students will be putting their knowledge to use. A good place to start is the *Pathways to Technology* Web site: http://www.pathwaystotechnology.org/fields/.

So far, we've encouraged the following important steps when thinking about outcomes:

1. Consider the skills students will need in the industry they are entering.
2. Identify what students should be able to do upon completion of the course.
3. Align your course with your degree program by looking at the program as a whole and talking with students and other teachers in the program.

In the next section, you will learn practical tips on getting started.

VI. Integrating Disciplines in Project-Based Learning VIDEO

Watch this video about a single project that links concepts from several different courses.

> **V Video Note**
> At this point in the module, please view the **Integrating Disciplines in Project-Based Learning** video. This video is available on the *Getting Results* course Web site at www.league.org/gettingresults or on the CD-ROM, available from the League (www.league.org).

Think About

How do the instructors in this video plan an integrated project with the outcome in mind?

> **V More about the class in the video**
> In the Engineering Technology program at Florence-Darlington Technical College in South Carolina, students are asked to solve several industry-related problems throughout the semester. They work in small groups to research options and present their solutions.

Although project-based instruction is used most often in higher-level classes, instructors in general education classes can also follow this model with success, rather than using textbook exercises that are "dry" or disconnected from the students' field of interest.

Section 3:
Developing Learning Outcomes

I. Writing Outcome Statements

Effective learning outcomes can take many forms, but each must:

- Have an action word that describes what the student will DO differently as a result of your course
- Describe meaningful learning
- Be measured/verified; i.e., you can measure students' ability to achieve them
- Represent high levels of thinking rather than trivial tasks
- Be written in plain language students can understand

Outcome statements that meet all of the above criteria are sometimes challenging to craft alone; you might want to bounce ideas off of a colleague.

With practice you should be able to get your ideas down to a few clearly written statements that define the purpose of the course for you and your students.

Here are two samples:

- Demonstrate the addition of sine waves using physical devices, instrumentation, and graphs.
- Use physical and chemical properties to determine the quality of paper samples and make recommendations based on specific requirements.

In the previous section, you envisioned students in the workplace and considered the input of your industry and program. Now come up with one to three outcomes that summarize what you want your students to be able to do as a result of taking your course.

Compare Your Answers

Consider the following outcome statements. Based on what you've just read, which of the following meet the criteria listed above, and which need to be revised or totally rewritten? Compare your answers to ours.

1. Understand Newton's three laws of motion.
2. Express numbers in scientific notation using the correct number of significant digits.
3. Diagnose failures in the vacuum, mechanical components, and controls of HVAC systems and determine necessary action for repairs.
4. Identify unknown bacteria using gram stain, biochemical, and other microbiological methods for identification.
5. Appreciate the difference between various forms of graphical representation.

Answers on page 11

II. Working from an Existing Course

Many teachers start in community colleges taking over an existing course. It's not unusual to be asked to teach a week—or even a day—before class starts and be handed a syllabus and a textbook to teach from. What do you do in this case?

Although you may not have the same time or freedom as a teacher planning a course from scratch, there are a few things you can do to modify an existing syllabus into one that is more student-centered and outcomes-focused.

Look at the learning outcomes or course objectives outlined in the curriculum.

If the syllabus is written in a traditional, content-focused format, the course objectives will outline what the teacher was planning to teach, not what is most important for students to be able to do at the end of the course.

See if you can rewrite the course objectives as three or four learning outcomes for the students.

This will make it clear to students what they will accomplish in the course and will help you keep student learning central to your teaching.

Look at the content mapped out in the rest of the syllabus, using your new student outcome statements as a filter.

Do all the readings, activities, and homework assignments support the student learning outcomes? If topics and readings no longer help the students attain the desired outcomes, get rid of them. If you find holes, ask your fellow teachers for suggestions on activities or try borrowing some ideas from teachers at other schools.

III. Action-Oriented Outcomes

As we defined earlier in this module, course outcomes, or learning objectives, should be observable, measurable, and action-oriented. Whenever possible, they should also build toward and measure higher-thinking skills such as synthesis, analysis, and evaluation. These pages will explore this in depth.

Look at the list of verbs in the **Measurable Criteria for Minimum Level of Success** table at the end of this document.

This list is intended to help you describe exactly what your students should be able to do upon completion of your course or program.

Which terms are appropriate for your ATE subject area? Place a check beside them. What action-oriented words would you add to the list? Write them in the blank spaces.

In the second column, write statements of measurable criteria beside the words you checked. Here are some examples:

- Calibrate ... equipment within a range of 10% accuracy
- Draw ... at least two ... pathways
- Program ... with a maximum of two errors
- Obtain ... an industry-standard sampling of ...

IV. Creating Assessment Tasks

Assessments are important tools when planning for outcomes because you cannot create lessons without them. When it comes to assessment of student learning, there are two major considerations.

When to Assess Learning

Many teachers approach assessment as a continuous process, collecting evidence of learning over time through observation, pop quizzes, journals, and some kind of culminating project that allows students to demonstrate learning in context.

How to Assess Learning

Assessment generally comes in two forms: traditional paper-pencil assessment (multiple choice, true/false, short essay, etc.), which can be useful for assessing WHAT students know; and performance tasks, which enable us to assess WHAT STUDENTS CAN DO with what they know. For these, instructors gather data as students complete tasks.

(For additional information and guidance in choosing assessments for your course, see Module 6.)

V. Planning Learning Experiences

Once you have identified the desired outcomes for your course and created appropriate assessments, the time is right to plan learning experiences. Key questions to be answered at this stage in the design process are:

- What concepts, themes, and issues do students need to understand in order to demonstrate the desired outcomes?
- What skills should students possess and perform in order to demonstrate the desired outcomes?
- How should skills and content be taught?
- What activities will impart the needed knowledge and skills to students?

Check Answers: *from statements, page 9*

1. "Understand" is not an action word and does not describe what students will be able to do differently as a result of the course. A better outcome might be: Use Newton's three laws of motion to predict motion in three dimensions.

2. This statement describes a discrete skill, but not an overarching goal of a class. A better outcome might be: Express and manipulate numbers effectively using the concepts of scientific notation, significant digits, and SI unit measurements.

3. This statement meets all the criteria.

4. This statement meets all the criteria.

5. This statement is vague and is not measurable. A better outcome might be: Given a set of data, construct a time series, scatterplot, or histogram to show relationships between quantities.

What Are Concepts, Themes, and Issues?

- *Concepts* are main ideas that make up a course of study; for example, theory of relativity.
- A course may have two or three core *themes*—such as evidence-based reasoning—that run throughout a course of study.
- *Issues*—such as communication, teamwork, and innovation—are skill areas beyond the core content that are essential to success in a course and need to be addressed when designing learning experiences.

As the content expert in the classroom, you likely have a vast knowledge and great enthusiasm for your subject. This is a great asset, but can also be a problem if you are unable to edit your course content down to what students can learn in a semester.

Paring Down Course Content

The following reading will help you determine how to focus your course content on the essentials.

Defining and Limiting Course Content

Excerpted from Beard and Hartley, 1984.
After you have "packed" all your topics into a preliminary list, toss out the excess baggage. Designing a course is somewhat like planning a transcontinental trip. First, list everything that you feel might be important for students to know, just as you might stuff several large suitcases with everything that you think you might need on a trip. Then severely pare down the topics you have listed, just as you might limit yourself to one or two pieces of luggage. Research shows that too much detail and too many topics work against students' learning the material.

Excerpted from Svinicki, 1990–1991.
Distinguish between essential and optional material. Divide the concepts or topics you want to cover into three groups: basic material should be mastered by every student, recommended material should be mastered by every student seeking a good knowledge of the subject, and optional material should be mastered by those students with special interests and aptitudes.

Lectures and exams should focus on the basic elements of the course. Recommended and optional topics, labeled as such for students, can be included in lectures, supplementary materials, and readings.

Emphasize the core concepts. For example, in engineering, as one professor points out, there are thousands of formulas, but all of these are variations on a very limited number of basic ideas or theories. In a single course, students might encounter a thousand equations. Rote memorization is futile because no one can remember that many equations. Instead, the instructor repeatedly emphasizes the fundamentals by showing students how the thousand equations are embedded in a dozen basic ones.

continued

Stress the classic issues, or the most enduring values or truths. Often the most interesting issues and themes for undergraduates turn out to be those that originally attracted you to the discipline.

Cut to the chase. Go for the most critical skills or ideas and drop the rest. For example, in solving mathematical problems, the most important task is setting up the problem—the rest is the mechanics. Not every problem needs to be worked through to completion.

Excerpted from http://honolulu.hawaii.edu/intranet/committees/FacDevCom/guidebk/teachtip/prepcors.htm.

Give students a conceptual framework on which to hang major ideas and factual information. To the uninitiated, your field may look like an unruly mass of facts devoid of logic or unifying principles. To understand the relationship among concepts rather than simply memorize dozens of discrete points, students need a framework—a basic theory, a theme, a typology, or a controversial issue. Make this framework apparent to the students through repeated references to it.

Now plan your learning. Traditionally, science content has been taught through lectures. However, research shows that students learn science best when actively involved.

Look for opportunities for students to take part in active discovery. Doing so will help them realize how scientific knowledge is created, understand connections between what they are doing in the classroom and what they will need to do in the workplace, and experience how the scientific process aids in evaluating new procedures and information. *Adapted from Reed, Winter 2005.*

This approach may take more time and effort than preparing lectures and demonstrations or guiding students through lab exercises, but the rewards are much greater as well.

(You will learn more about planning course activities in Module 3.)

VI. Writing Your Syllabus

The final step in planning your course, once you have written your outcomes, created assessment tasks, and planned learning experiences, is to write the course syllabus.

Syllabi typically fall into one of three frameworks: content-focused, competency-focused, and outcomes-focused.

A *content-focused* syllabus focuses primarily on what content the instructor will cover in the course. It highlights topics, assignments, and readings.

A *competency-focused* syllabus focuses on what competencies students should demonstrate in the course. These competencies are usually converted to a grade.

An *outcomes-focused* syllabus focuses on what the students should be able to do upon completion of the course. It explains the themes, concepts, and issues students need to understand, and what skills they will have upon completion.

Many faculty think of a syllabus as a table of contents for the course and follow the content-focused model. When writing your syllabus, we encourage you to use the outcomes-focused model, which tells the students exactly what is expected of them and what they will be able to do when the course is over.

On the following pages are examples of a content-focused syllabus and an outcomes-focused syllabus. Look at the documents and compare their components. Imagine that you are a student receiving these documents on the first day of class. How would the information in the syllabus guide your thinking and understanding of what would happen in the class?

Syllabi for Aerial Photo Interpretation

CONTENT-FOCUSED SYLLABUS

Course Description

This course teaches the fundamentals needed to use aerial photographs...

This describes what the teacher will do.

Course Goal

The purpose of this course is to provide the fundamentals of photograph interpretation...

The instructor provides the information and knowledge base.

Course Objectives

1. To explain how students can navigate using aerial photographs
2. To select and set photos up for stereoscopic viewing
3. To illustrate relationships between aerial photos, maps, and the ground

These describe what the instructor will do.

Text

1. *How to Use Aerial Photography in Natural Resource Applications*, 1988, Caylor, J.A., required
2. *Log Scaling and Timber Cruising*, 1988, Bell-Dilworth, recommended

Topics for study come from these texts and are based on the content.

OUTCOMES-FOCUSED SYLLABUS

Course Description

This course will enable you to gather information about land through aerial photography...

This describes what the student will be able to do upon completion of the course.

Course Themes

Aerial Photography, Interpretation

These are overriding themes addressed in the course.

Learning Outcomes

The intention is for you to learn how to obtain 3-dimensional views from aerial photographs...

This reflects the course description and describes specifically what the students will do.

Assessment Tasks

You will be asked to demonstrate the above outcome through an assigned class project that will show evidence of your ability to:

1. Navigate using aerial photographs.
2. Select correct photos and set photos up for stereoscopic viewing.
3. Recognize relationships between aerial photos, maps...

The tasks are connected, as are the actions that students will do and be graded on.

Syllabi for Aerial Photo Interpretation
(continued)

CONTENT-FOCUSED SYLLABUS

Course Schedule

- *Week 1* – Introductions and course overview
- *Week 2* – Geometry of Aerial Photos, Principles of Stereoscopy
- *Week 3* – Photo scale concepts and application

This is a listing of topics.

Class Policies

- Class and Lab Attendance – Attendance at all classes is expected. Most labs cannot be made up because they occur in the field or require extensive equipment setup. Grading is based on attendance (10%)
- Grading – We will have one midterm exam in addition to six homework or in-class assignments…

  Attendance 10%

  Midterm 25%

  In-class Homework 25%

  Final Exam 40%

Grading on attendance does not assess what the students have learned.

OUTCOMES-FOCUSED SYLLABUS

Course Content

- *Concepts* – Topographical; 3-Dimensional Views; Stereoscopic Viewing; Ground Features; Interpretation
- *Issues* – Selection of correct photos
- *Skills* – Plan collaboratively; Read maps clearly; Recognize relationships between maps, photos, and the ground; Identify ground features and visible conditions

This is expressed in concepts students understand, issues they will resolve, and skills they will have to demonstrate.

Learning Resources

There are many texts that can provide you with information relevant to this course, including those listed below. You should gather information from different resources and share it with classmates...

1. *How to Use Aerial Photography in Natural Resource Applications*, 1988, Caylor, J.A., required
2. *Log Scaling and Timber Cruising*, 1988, Bell-Dilworth, recommended

This list highlights important texts and encourages students to reach beyond the assigned tasks.

Syllabi for Aerial Photo Interpretation
(continued)

OUTCOMES-FOCUSED SYLLABUS

Assessment and Grading
In-Class Learning Activities and Tasks

- *Week 1* – Build meaning around key concepts, review forest measurements, learn about fellow classmates and instructor.
- *Week 2* – Discuss geometry of aerial photos and the principles of stereoscopy. Prepare and view stereo pairs.
- *Week 3* – Photo scale concepts and application, work on scale practice problems.
- *Week 4* – Measuring displacement, navigation with aerial photos, field lab. *Assessment: Task 1 – Navigate using aerial photographs (20%)*
- *Week 5* – Scale continued, area determination; determining scale and area. *Assessment: Knowledge Test*
- *Week 6* – Measuring angles on aerial photos.
- *Week 7* – Interpreting photo images; Larch Mountain – team navigation, field lab. *Assessment: Task 2 – Select and set photos (20%)*

The quality of the work will be assessed against specific expectations that will be clear before work is submitted.

Compare the full version of the content-focused syllabus to the full version of the outcomes-focused syllabus, both included at the end of this document.

Section 4: Self-Assessment and Resources

I. Looking Back at Your Notebook

Look back at your notebook. Reflect on what you've learned about planning for outcomes. Review the elements that will help you shift to instructional planning and begin to think about your course in this way.

How will you design or redesign your course so that students will learn the skills, issues, and concepts they will need in the workplace?

II. Resources and Readings

For additional information on writing your course syllabus and examples of good syllabi, see the following resources:

This University of Pittsburgh site explains the purpose of a syllabus and contains an example of an outcomes-based course syllabus:
http://www.pitt.edu/~ciddeweb/FACULTY-DEVELOPMENT/FDS/syllabus.html

This article contains information on essential components of a syllabus:
http://www.adjunctnation.com/archive/magazine/article/?id_article=368

This site contains examples and explanations of learner-centered syllabi:
http://4faculty.org/includes/105r2.jsp

This book provides more information on outcomes-focused teaching and learning:
Stiehl, Ruth, and Les Lewchuk. Envisioning Outcomes Intended and Unintended. *The OUTCOMES Primer.* Corvallis, OR: The Learning Organization, 2002.

This book contains information on another useful planning model called backward design:
Wiggins, Grant, and Jay McTighe. Are the Best Curricular Designs "Backward"? In *Understanding by Design*. Alexandria, Va.: Association for Supervision and Curriculum Development, 1998.

This resource provides additional information about the science of learning:
Reed, Lester. Learning Science: A NCSR Approach. In *NCSR (Northwest Center for Sustainable Resources) News.* Vol. 2, Issue 2. Winter 2005.

III. Summary of Module 2

The students' journey is the single most important consideration when teaching, and student success is greatly impacted by good planning.

When planning for outcomes:

- You need to know specifically *what the students should be able to do* in the workplace and the certification standards for that industry.
- You need to *link your course goals* with the larger program goals.
- You need to *plan your outcomes first* and then plan activities that support the outcomes.
- You need to *write a course syllabus* that focuses specifically on what the students should be able to do upon completion of the course.

Designing a course with outcomes in mind helps teachers plan with clear goals for themselves and their students.

Measurable Criteria for Minimum Level of Success

✔	Verbs	Statements of Measurable Criteria
	Analyze	
	Assemble	
	Assess	
	Build	
	Calculate	
	Calibrate	
	Categorize	
	Chart	
	Classify	
	Collect	
	Compare	
	Compile	
	Complete	
	Construct	
	Coordinate	
	Define	
	Demonstrate	
	Describe	
	Design	
	Determine	
	Diagnose	
	Diagram	
	Differentiate	
	Discuss	

✔	Verbs	Statements of Measurable Criteria
	Distinguish	
	Draw	
	Estimate	
	Evaluate	
	Explain	
	Formulate	
	Illustrate	
	Implement	
	Improve	
	Integrate	
	Interpret	
	Maintain	
	Manage	
	Manipulate	
	Map	
	Measure	
	Monitor	
	Obtain	
	Operate	
	Organize	
	Perform	
	Predict	
	Process	
	Produce	

Measurable Criteria for Minimum Level of Success *(continued)*

✔	Verbs	Statements of Measurable Criteria
	Program	
	Prove	
	Quantify	
	Rate	
	Refine	
	Rehabilitate	
	Repair	
	Report	
	Sample	
	Sequence	
	Solve	
	Summarize	
	Test	
	Troubleshoot	
	Use	
	Utilize	

✔	Verbs	Statements of Measurable Criteria

Aerial Photo Interpretation 3 Credits

(Outcomes-Focused Syllabus)

COURSE DESCRIPTION

This course will enable YOU to gather information about land through aerial photography in your work with wildlife management specialists. *(The course description doesn't list the topics, but talks about what you, the student, will be able to do if you are successful in completing this course.)*

COURSE THEMES

Aerial Photography, Interpretation *(These are the themes addressed in the course.)*

LEARNING OUTCOMES

When you have successfully completed this course, you should be able to obtain three-dimensional views from aerial photographs, relate the features on the photos to the same features on topographical maps and on the ground, as well as estimate areas of land and heights of features on the photos. *(All of these things are connected, not isolated, and reflect the course description.)*

ASSESSMENT TASKS

You will be asked to demonstrate the above outcomes through an assigned class project that will show evidence of your ability to: *(This is the work that the students will do that will be graded.)*

1. Navigate using aerial photographs
2. Select correct photos and set photos up for stereoscopic viewing.
3. Recognize relationships between aerial photos, maps, and the ground.
4. Identify through interpretation a variety of ground features and conditions visible on aerial photographs.
5. Determine area, distance, and height information from aerial photographs.

COURSE CONTENT

CONCEPTS AND ISSUES	**SKILLS** *(These are specific actions the students will carry out.)*
Concepts *(These are concepts the students should understand.)* Topography Three-dimensional views Stereoscopic viewing Ground features Interpretation **Issues** *(This is a list of potential problems students will face in the field. Here they are given the opportunity to use critical-thinking skills to resolve issues. This is the highest cognitive work.)* Selection of correct photos	• Plan collaboratively • Read maps clearly • Recognize relationships between maps, photos, and the ground • Identify ground features and visible conditions

LEARNING RESOURCES

(There are multiple sources of information, and with all of the technology available to students today, they are encouraged to reach beyond the assigned texts. The two recommended texts cover some of the relevant content areas.)

There are many texts that can provide you with information relevant to this course. You should gather information from different resources and share it with classmates. You should do research at the library, talk with others in the field, and visit other faculty members within this department to enhance your knowledge in this area. Here are two texts you should begin with:

1. *How to Use Aerial Photography in Natural Resource Applications,* 1988, Caylor, J.A.
2. *Log Scaling and Timber Cruising,* 1988, Bell-Dilworth.

ASSESSMENT AND GRADING

The quality of your work will be assessed against specific expectations, which will be clear to you before you submit your work for assessment by the instructor. *(Students know what is expected of them, there is no guessing. They should receive scoring guides or rubrics for each of the tasks so they know exactly what the instructor will be looking for.)* The following five tasks will be assessed for grading purposes *(Notice that class attendance is not used for grading purposes. Students are graded on their ability to do something with what they know.)*

15% Task #1: Navigate using aerial photographs
15% Task #2: Select and set photos
15% Task #3: Recognize relationships between aerial photos, maps, and the ground
15% Task #4: Identify ground features and conditions visible on aerial photographs
15% Task #5: Determine area, distance, and height information from aerial photographs

25% In addition to these tasks, you will be assessed on your knowledge base through a midterm examination

IN-CLASS LEARNING ACTIVITIES	**ASSESSMENT** *(This gives students a clear road map of when and how they will be graded and illustrates how the tasks build off each other.)*
Week One Build meaning around key concepts, review forest measurements, learn about fellow classmates and instructor.	
Week Two Discuss geometry of aerial photos and the principles of stereoscopy. Prepare and view stereo pairs.	
Week Three Photo scale concepts and application, work on scale practice problems.	
Week Four Measuring displacement Navigation with aerial photos, field lab **(Task #1)**	TASK 1

IN-CLASS LEARNING ACTIVITIES	ASSESSMENT
Week Five **MIDTERM EXAM** Scale continued, area determination Determining scale and area	**MIDTERM EXAM**
Week Six Measuring angles on aerial photos	
Week Seven Interpreting photo images Larch Mountain: team navigation, field lab **(Task #2)**	TASK 2
Week Eight Theme extraction, vegetation typing Larch Mt: vegetation typing, field lab **(Task #3)**	TASK 3
Week Nine Recognize land form and drainage patterns Larch Mt: vegetation typing, field lab Estimating heights, elevation Practice problems Vegetation typing report **(Task #4)**	TASK 4
Week Ten Estimating heights and elevation change Navigation challenge (**Task #5)**	TASK 5
Week Eleven Change detection	

Aerial Photo Interpretation 3 Credits

(Content-Focused Syllabus)

COURSE DESCRIPTION

This course teaches the fundamentals of aerial photography as aids for fieldwork and preliminary information gathering. The course covers three-dimensional views from the photos, features on the photos as they relate to the same features on topographical maps and on the ground, and estimation of areas of land and heights of features on photos. Vegetation typing, basic principles of photo attributes, and the use of photos as basic maps in the field are also included. *(A typical content-focused course description lists the topics covered in the course, but does not include what the students will do or what is expected of them.)*

COURSE GOAL

The purpose of this course is to provide the fundamentals of photograph interpretation. *(The goal says that the course will provide the fundamentals of photograph interpretation, when in fact it is the instructor who provides the information and knowledge base. This goal focuses on the instructor and what he/she will do.)*

COURSE OBJECTIVES

1. To explain how to navigate using aerial photographs.
2. To show how to select and set up photos for stereoscopic viewing.
3. To illustrate relationships between aerial photos, maps, and the ground.
4. To demonstrate through interpretation a variety of ground features and conditions visible on aerial photographs.
5. To give formulas on measuring area, distance, and height information from aerial photographs.

(These course objectives are very traditional, and again relate to the instructor. "To explain… to show… to illustrate… to demonstrate… to give formulas…" all describe what the instructor will do, not what the students will do.)

TEXT

How to Use Aerial Photography in Natural Resource Applications, 1988, Caylor, J.A., required

Log Scaling and Timber Cruising, 1988, Bell-Dilworth, recommended

(This is a short list of resources. The topics covered come from the textbook.)

COURSE SCHEDULE

(In a traditional content-focused syllabus, topics covered are listed, as they are here.)

WEEK	TOPICS
Week 1	Introductions and course overview
Week 2	Geometry of aerial photos, principles of stereoscopy
Week 3	Photo scale concepts and application
Week 4	Measurement and displacement, navigation with aerial photos
Week 5	Scale continued, area determination
Week 6	Angles on aerial photos MIDTERM
Week 7	Photo image interpretation Larch Mountain: team navigation
Week 8	Theme Extraction, vegetation typing
Week 9	Landform and Drainage pattern
Week 10	Heights and elevation change
Week 11	FINAL EXAM

Class Policies

CLASS AND LAB ATTENDANCE Attendance at all classes is expected. Most labs cannot be made-up because they occur in the field or required extensive equipment set up. 10% of the grading is based on class attendance. *(This is common in a content-focused syllabus, grading students for sitting under an instructors' tutelage, rather than on something they have done.)*

MAKE-UP EXAMS Requests to take a make-up exam or to make up an in-class assignment must be made prior to the scheduled date.

GRADING We will have one midterm exam *(content-focused, knowledge-based exam)* in addition to six homework or in-class assignments. In-class assignments will be completed during the class time and turned in at the end of class. The final will be comprehensive and include a lab practical *(knowledge- based and skill-based).* Your grade will be calculated by these proportions:

10% Attendance
25% Midterm
25% In-class Assignments/Homework
40% Final Exam