Overview & Examples:
Program Educational Objectives (PEOs), Program Outcomes (POs),
Course Outcomes (COs)

Program Educational Objectives (Texas Tech University)

The mission of Texas Tech University and Texas Tech University Health Sciences Center is to provide the highest standard of excellence in higher education, while pursuing continuous quality improvement, stimulating the greatest degree of meaningful research and supporting faculty and staff in satisfying those whom we serve. The Department of Electrical and Computer Engineering supports the mission of the University through its undergraduate programs by providing students with appropriate curricula and educational experiences. The curricula remain current through continuing assessment by employers, alumni, faculty and students. The electrical engineering areas in the department include circuits and systems, electronics, communications, digital systems, microcontrollers, programming, control systems, electromagnetics and a number of technical and nontechnical support courses. Students obtain a broad education necessary to understand the impact of electrical engineering solutions in a global, societal, and environmental context. To accomplish the mission, the electrical engineering faculty, with advice from students, alumni and employers, endorse the following objectives:

In their first few years on the job, graduates of the Electrical Engineering program at Texas Tech University should be able to utilize the knowledge gained from their academic program to:

I. Solve important problems in a modern technological society as valuable, productive engineers.
II. Enter and succeed in a graduate program.
III. Function and communicate effectively, both individually and within multidisciplinary teams.
IV. Continue the process of life long learning.
V. Be sensitive to the consequences of their work, both ethically and professionally, for productive professional careers.

Educational Objectives and Curriculum

<table>
<thead>
<tr>
<th>Educational Objectives</th>
<th>Strategies/Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Solve important problems in a modern technological society as valuable, productive</td>
<td>Curriculum requirement of courses in mathematics; physics; basic science and</td>
</tr>
<tr>
<td>engineers.</td>
<td>engineering, and non technical support courses.</td>
</tr>
<tr>
<td></td>
<td>Curriculum requirement of circuits and systems, electronics, software engineering,</td>
</tr>
<tr>
<td></td>
<td>communications, digital systems, microcontrollers, programming, systems</td>
</tr>
<tr>
<td></td>
<td>programming, operating systems, design and analysis of algorithms, computer</td>
</tr>
<tr>
<td></td>
<td>architecture and a number of technical</td>
</tr>
</tbody>
</table>
### Educational Objectives

<table>
<thead>
<tr>
<th>II. Enter and succeed in a graduate program.</th>
<th>Quality background in fundamental courses. Advanced specialty courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>III. Function and communicate effectively, both individually and within multidisciplinary teams.</td>
<td>Five 3-hour credit Project Laboratories with specific requirements that include long term, open-ended design problems with emphasis on team work and communication</td>
</tr>
<tr>
<td>IV. Continue the process of life long learning.</td>
<td>Five 3-hour credit Project Laboratories with specific requirements that include long term, open-ended design problems that expose students to areas they have not seen before</td>
</tr>
<tr>
<td>V. Be sensitive to the consequences of their work, both ethically and professionally, for productive professional careers.</td>
<td>Curriculum requirement of courses in introductory electrical and computer engineering, and additional University &quot;core curriculum&quot; courses. Project Laboratory experience</td>
</tr>
</tbody>
</table>

### Strategies/Actions

- support courses.
- Project Laboratory Sequence

### Program Outcomes and Assessment

To enable TTU EE students to accomplish the Educational Objectives in Criterion 2, the curriculum is designed to assure students, at the time of graduation are able to:

1. Identify, analyze and solve electrical engineering problems by applying knowledge of mathematics, science and engineering with modern engineering tools in the specific areas of:
   1.1. circuits and systems
   1.2. electronics
   1.3. communications
   1.4. digital systems
   1.5. microcontrollers
   1.6. programming
   1.7. control systems
   1.8. electromagnetics
   1.9. technical specialty chosen by the student
2. Design a system, component or process to meet desired needs within realistic constraints
3. Design and conduct scientific and engineering experiments, and to analyze and interpret the resulting data.
4. Recognize the need for and have the ability to engage in, perpetual learning by working on projects for which they have no prior experience.
5. Have a fundamental capability in oral and written communication
6. Function effectively within multidisciplinary teams
7. Understand ethical and professional engineering practice in the context of global, economic, environmental and societal realities as well as other contemporary issues.

In addition, the Department of Electrical and Computer Engineering will continue to strive to provide the educational environment for all students, regardless of ethnicity or gender to succeed in accomplishing these objectives in an appropriate time period.

The relationship between the Program Outcomes, the Educational Objectives and ABET Criteria a-k are shown in the Table 3.1. In addition, the actions used to satisfy the outcomes and the assessment tools for each outcome are shown.

### ELECTRICAL ENGINEERING PROGRAM OUTCOMES

<table>
<thead>
<tr>
<th>Program Outcomes</th>
<th>EO</th>
<th>ABET a-k</th>
<th>Strategies/Actions</th>
<th>Assessment Methods</th>
</tr>
</thead>
</table>
| 1. Students will be able to identify, analyze and solve basic electrical engineering problems, in specific areas, by applying knowledge of mathematics, science and engineering with modern engineering tools | I, II| a, e, k  | Curriculum requirement of courses in mathematics; physics; electrical engineering and computer science. Establishment of Course Learning Objectives (CLOs) for electrical engineering courses. | Grades in respective courses
Sample student work
Student Assessment of CLOs
Faculty Assessment of CLOs
Basic Skills exam
Mock FE exam
Student/IAB/Faculty input |
| 2. Students will be able to design a system, component or process to meet desired needs within realistic constraints. | I, II| a, c, e, k | Project Laboratory experience with specific requirements that included long term, open-ended design problems with emphasize on team work, communication and perpetual learning | Student laboratory portfolios Grades in respective courses
Sample student work
Student Assessment of CLOs
Faculty Assessment of CLOs
Student/IAB/Faculty input |
<table>
<thead>
<tr>
<th>Program Outcomes</th>
<th>Actions and Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3. Students will be able to design and conduct scientific and engineering experiments, and to analyze and interpret the resulting data</strong></td>
<td>Student laboratory portfolios Grades in respective courses Sample student work Student Assessment of CLOs Faculty Assessment of CLOs Student/IAB/Faculty input</td>
</tr>
<tr>
<td><strong>4. Recognize the need for and have the ability to engage in perpetual learning by working on projects for which they have no prior experience.</strong></td>
<td>Student laboratory portfolios Grades in respective courses Student Assessment of CLOs Faculty Assessment of CLOs Student/IAB/Faculty input</td>
</tr>
<tr>
<td><strong>5. Students will have a strong, fundamental capability in oral and written communication</strong></td>
<td>Student laboratory portfolios Grades in particular areas in respective courses Student Assessment of CLOs Faculty Assessment of CLOs Student/IAB/Faculty input</td>
</tr>
<tr>
<td><strong>6. Students will be able to function and communicate effectively, both individually and within multidisciplinary teams</strong></td>
<td>Student laboratory portfolios Grades in particular areas in respective courses Student Assessment of CLOs Faculty Assessment of CLOs Student/IAB/Faculty input</td>
</tr>
<tr>
<td><strong>7. Students will be able to understand ethical and professional engineering practice in the context of global, economic, environmental and societal realities as well as other contemporary issues</strong></td>
<td>Grades in core courses Grades in particular areas in respective courses Student Assessment of CLOs Faculty Assessment of CLOs Student/IAB/Faculty input</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Program Outcomes, Actions and Assessment</strong></th>
<th><strong>Grades in core courses</strong></th>
<th><strong>Grades in particular areas in respective courses</strong></th>
<th><strong>Student Assessment of CLOs</strong></th>
<th><strong>Faculty Assessment of CLOs</strong></th>
<th><strong>Student/IAB/Faculty input</strong></th>
</tr>
</thead>
</table>
A Basic Guide to Writing Student Learning Outcome Statements

There is a lot of literature about the difference between goals, objectives and outcomes. For our purposes, a goal (or aim) is a broad, general statement which may include the philosophical base that underpins a unit of study. There is also considerable debate over the use of the terms "objective" and "outcome", however, for our purposes we will ignore this conflict and take them to mean the same thing.

Finally, there are many different ways to go about writing outcome statements with no one method being correct. The following is merely intended as a guide of how to make a start.

What is a learning outcome statement?

A learning outcome is a statement of what a learner is expected to know, understand or be able to do as a result of a learning process.

Why write learning outcome statements?

- Identifying outcomes is an effective way to review curriculum and content. This leads to a more balanced and well sequenced curriculum.
- It is effective in designing appropriate assessment.
- Lecturers know exactly what students are expected to learn in their own unit as well as in previous units.
- Staff are easily able to evaluate the effectiveness of their teaching. Have the outcomes been achieved?
- An instructional shift from teaching to learning is facilitated. The focus is on the learner rather than the teacher.
- Students will know exactly what they are expected to learn for each unit. They know where they stand and the curriculum is more open to them.
- Students will know exactly how their learning will be assessed.
- Students begin to take more responsibility for their own learning when they know what they are expected to do and what standard they are expected to achieve.

What do you need to think about before you write learning outcome statements? Some ideas!

- What information or content do you want the students to learn from your unit?
- What do you want them to do with that information?
- What skills or competencies do you want them to learn or develop?
- What kinds of higher level thinking do you want them to engage in?
- How do you expect students to demonstrate what they have learned and how well they have learned it?
- At the very minimum, what should students know and be able to do when they finish your unit?
- How do you think they will be able to use the information and skills that they have developed?
- If someone asks the students what have they learned in your unit, how would you like them to answer?
OK, make a start!

1. Think about the big picture - what is the major aim of the unit of study? What is the unit trying to achieve? It is much better to sketch out the whole unit before you go to the specifics. Write the goal or aim statement for your unit if it does not already exist. This should be a broad general statement. The goal or aim statement of a unit does not give students specific information about what they will be expected to be able to do or know nor does it give information about how they will be assessed.

For example: General Genetics 204 (139.204)

This unit provides an introduction to the fundamental concepts responsible for diversity of form, function and life responses found in all biological organisms. The principles of Mendelian, population, quantitative, cyto and molecular genetics are considered together with the implications they have for advancing understanding of human disease, plant/animal/microbe interactions, plant/animal/microbe physiology and metabolism and genotype x environment interactions.

2. Consider the scope of your unit. Specify the major topics or sections in your unit by brainstorming and making a list. What sorts of things do you want the students to learn? At this level the outcome statements will be quite broad referring to such areas as communication skills, computer literacy and problem solving.

For example:

It is anticipated that students who successfully complete ....... will be able to:

- demonstrate proficiency within the laboratory by the correct use of the appropriate equipment.
- communicate their comprehension of ....... concepts by being able to follow and construct sound ....... arguments.
- express their ideas coherently and logically when working both independently and cooperatively in both practical sessions and through assignments.
- demonstrate computer literacy by the use of internet resources and appropriate software in tutorial/laboratory sessions.
- critically appraise the strengths and weaknesses of ........., proposing solutions to problems affecting the implementation of .........

3. The next step is to identify specifics. What specific, detailed knowledge, information, or skills do you expect your students to learn for each section or lecture of your unit. Brainstorm and create a list. This is where you will write clear, precise statements that detail what the students will be actually doing.

Your list may include:

- specific calculations
- specific skills, e.g. learn how to use the graphing function of Excel
- demonstrate a specific technique
- recall certain facts
- draw a particular diagram

4. You now need to think about how students can demonstrate their learning, i.e. exactly what should they be able to do. Brainstorm and generate a list of ideas for how students can demonstrate what, how much and how well they have learned.
Your list may include:

- give an oral presentation
- conduct a section of a tutorial session
- write a report
- collaborate in a group
- answer specific questions
- complete a particular task

You now should have a list of specific things that you want your students to be able to learn and skills that they should be able to do. You now need to write these ideas into learning outcome statements. Remember that there are no set number of learning outcomes however each learning outcome statement should be able to be assessed. If you have too many outcomes maybe you need to think about the amount of content that you are trying to cover!

**Writing Learning Outcomes -1**

Learning outcomes should be expressed through the use of active verbs which spell out what students will be able to do. In order to achieve clarity, expressions such as 'to know', 'to understand', 'to appreciate', to be acquainted with', should be avoided, since they are too vague to convey the exact nature of the outcome being sought. More active and explicit verbs such as 'state', 'show', 'explain', 'define', 'describe', 'predict', 'recognise' and 'criticise' should be used wherever possible.

A number of lists of suitable vocabulary for expressing learning outcomes have been developed in other higher education institutions and in regional and national credit consortiums. The lists which follow have "creatively plagiarised" a number of these lists. (Thanks to Higher Education Credit Initiative Wales; University of Derby; Thames Valley University). The verbs are grouped as they relate to the various generic level descriptors. These are a guide only - they have to be applied to subject knowledge, understanding and skills.

**A. Cognitive Areas**

**i Activities which give evidence of knowing**
Define, describe, identify, label, list, name, outline, reproduce, recall, select, state, present, extract, organise, recount, write, measure, relate, match, record.

**ii Activities giving evidence of comprehension**
Interpret, translate, estimate, justify, clarify, defend, distinguish, explain, generalise, exemplify, infer, predict, rewrite, summarise, discuss, perform, report, present, indicate, find, represent, formulate, contrast, classify, express, compare, recognise, account.

**iii Activities giving evidence of application of knowledge/understanding**
Apply, solve, demonstrate, change, compute, manipulate, use, employ, modify, operate, predict, produce, relate, show, select, choose, assess, operate, illustrate, verify.

**iv Activities giving evidence of analysis**
Recognise, distinguish between, evaluate, analyse, break down, differentiate, identify, illustrate how, infer, outline, point out, relate, select, separate, divide, compare, contrast, justify, resolve, examine, conclude, criticise, question, diagnose, categorise, elucidate.

**v Activities giving evidence of synthesis**
Arrange, assemble, organise, plan, prepare, design, formulate, construct, propose, present, explain,
modify, reconstruct, relate, re-organise, revise, write, summarise, account for, report, alter, argue, order, select, manage, generalise, derive, synthesise, enlarge, suggest.

vi Activities giving evidence of creativity
Originate, image, begin, design, invent, initiate, state, create, pattern, elaborate, develop, devise, generate, engender

vii Activities giving evidence of evaluation
judge, evaluate, assess, discriminate, appraise, conclude, compare, contrast, criticise, justify, defend, rate, determine, choose, value, question, measure.

B. Transferable Skills

i Psycho-motor skills
Perform, execute, operate, manipulate

ii Self Appraisal and Reflection on Practice
Reflect, identify, recognise, evaluate, criticise, judge

iii Planning and Management of Learning
Plan, prioritise, access, use, select, explore, identify, decide

iv Problem-solving
Identify, choose, select, recognise, implement, define, apply, assess, resolve, propose, formulate, plan

v Communication Presentation
Communicate, express, articulate, question, examine, argue, debate, explain, formalise, respond, rebut, justify, defend, listen, illustrate, demonstrate, organise, pace, model, summarise

vi Interactive and group skills
Accommodate, interact, collaborate, participate, co-operate, co-ordinate, structure, arbitrate, initiate, lead, direct, guide, support, decide, set goals, motivate, reflect, evaluate, recognise, enable, Learning Support Services, confirm, include

Writing Learning Outcomes -2

Outcomes should be written in clear language, identify important learning requirements, be assessable and be written in the future tense. Key features of an outcome learning statement include:
- an action verb - describes what the learner will be doing.
- measurable criterion - how the learning will be evaluated.

Sometimes you can also state the
- conditions of performance - under what conditions will the learning take place.

Example 1
Given [certain information], the student will be able to identify the similarities and differences between .......... and ........, construct a hypothesis to explain or predict the results, and justify their hypothesis by reference to the listed literature.

Example 2
Given a diagram of ......., without consulting a reference source the student will be able to identify the ......... and ......... and write the correct terms for the process with 100% accuracy.

**Action verbs**
The use of words to "understand" or "appreciate" are essentially useless as they do not convey what the student should be doing. Bloom's taxonomy can help as it defines 6 categories or levels of thinking. The following list can help to generate ideas for writing learning outcome statements.

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Comprehension</th>
<th>Application</th>
<th>Analysis</th>
<th>Synthesis</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>define</td>
<td>describe</td>
<td>apply</td>
<td>analyse</td>
<td>arrange</td>
<td>appraise</td>
</tr>
<tr>
<td>list</td>
<td>discuss</td>
<td>demonstrate</td>
<td>appraise</td>
<td>assemble</td>
<td>assess</td>
</tr>
<tr>
<td>name</td>
<td>explain</td>
<td>dramatise</td>
<td>calculate</td>
<td>collect</td>
<td>choose</td>
</tr>
<tr>
<td>recall</td>
<td>express</td>
<td>employ</td>
<td>categorise</td>
<td>compose</td>
<td>compare</td>
</tr>
<tr>
<td>record</td>
<td>depict</td>
<td>illustrate</td>
<td>criticise</td>
<td>construct</td>
<td>estimate</td>
</tr>
<tr>
<td>relate</td>
<td>locate</td>
<td>interpret</td>
<td>debate</td>
<td>create</td>
<td>evaluate</td>
</tr>
<tr>
<td>underline</td>
<td>recognise</td>
<td>operate</td>
<td>diagram</td>
<td>design</td>
<td>judge</td>
</tr>
<tr>
<td>label</td>
<td>report</td>
<td>practice</td>
<td>differentiate</td>
<td>formulate</td>
<td>measure</td>
</tr>
<tr>
<td>quote</td>
<td>restate</td>
<td>schedule</td>
<td>distinguish</td>
<td>manage</td>
<td>rate</td>
</tr>
<tr>
<td>locate</td>
<td>review</td>
<td>sketch</td>
<td>examine</td>
<td>organise</td>
<td>revise</td>
</tr>
<tr>
<td>match</td>
<td>translate</td>
<td>use</td>
<td>experiment</td>
<td>plan</td>
<td>score</td>
</tr>
<tr>
<td>cite</td>
<td></td>
<td></td>
<td>inspect</td>
<td>prepare</td>
<td>select</td>
</tr>
<tr>
<td>reproduce</td>
<td></td>
<td></td>
<td>question</td>
<td>propose</td>
<td>value</td>
</tr>
<tr>
<td>identify</td>
<td></td>
<td></td>
<td>relate</td>
<td>combine</td>
<td>defend</td>
</tr>
<tr>
<td>state</td>
<td></td>
<td></td>
<td>solve</td>
<td>integrate</td>
<td>justify</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>test</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>classify</td>
<td></td>
</tr>
</tbody>
</table>

**Some simple tools that may help you to write the statements.**

| Conditions | given "x"       | without "y" |
| Performance| the student will (action verb) |
| Criteria/standard | accuracy | quantity | time constraints |

**Some examples of learning outcome statements.**

Using the above tools, these statements give the student information about what they will be doing and how they will be assessed. Some statements also give information about the condition of
performance, i.e. the students can use a graphic calculator.

- Working individually, students will be able to assess in writing the impact of ..... on the ..... using all listed references.

- Using the computer program ......., students will be able to examine the events relating to ..... and create a realistic time-frame of.....

- Students will be able to individually calibrate [equipment] and then process a sample of ..... to demonstrate the use of ........

- Without reference to a resource, students will be able to locate and recall the .... pathway from a diagram showing .... and identify ....... within a ...... time-frame.

- Using a graphics calculator, students will be able to calculate ...... , evaluate the effectiveness of ...... and orally present their findings to their tutorial group.

Poorly written outcome learning statements often do not state what the students should be doing or how they will be assessed. For example,

- Students will demonstrate an understanding of the connections between morality and law.
- Students will demonstrate proficiency with conversational Japanese by the end of the semester.
- Students will get an introduction to statistics and its practical application.

a) Knowledge and Understanding

Successful students will typically be able to:

i. critically analyse and evaluate a variety of laws, policies and institutions of drugs control
ii. evaluate the various criminological theories in relation to drug issues
iii. critically analyse and assess the role of the criminal justice system as a response to drugs in contemporary societies through the application of criminological theories and concepts
iv. demonstrate an appreciation of the diversity and similarities between different systems of drug control.

b) Skills and Attributes

i. demonstrate an ability to organise and communicate thoughts and ideas on drugs issues through oral presentations and written assignments
ii. identify, summarise and critique key debates and arguments, orally and in writing
iii. demonstrate effective information handling and research skills (identification of, selection of and critical engagement in key texts and documents).

Assessment criteria
These are descriptions of what the learner is expected to do in order to demonstrate that a learning outcome has been achieved. They are set at a threshold level of achievement (in other words, a bare pass), and any performance above that level can be differentiated by applying grading criteria (see section 6 below).

3. EXAMPLE LEARNING OUTCOMES

The examples provided here are taken from a range of disciplines. Outcomes relating to knowledge and understanding and to intellectual skills use Bloom’s Taxonomy as their basis. There are then two further categories relating to practical (i.e. subject-specific) skills, and key/transferable (i.e. generic) skills.

Knowledge & understanding

On successful completion of the module, students will be able to:

- Explain the meaning, character and identity of place, and how landscape is constructed.
- Identify the theories of learning that are implicit in their current approach to education.
- Discuss Romantic poetry in relation to the major themes of Romanticism.
- Describe the underlying principles governing gene transmission and expression.

Pointers on knowledge and understanding outcomes

- Avoid learning outcomes which are TOO BROAD in scope, such as ‘Recall the fundamental concepts of Structural, Mechanical and Electrical Engineering.’
- Avoid learning outcomes which are TOO NARROW in scope, such as ‘State the six categories in Bloom’s Taxonomy.’
- Avoid overloading your modules with TOO MUCH ‘CONTENT’: knowledge and understanding outcomes emphasize what your students will be able to comprehend and explain, but this isn’t as important as being able to USE the information through application, analysis, synthesis and evaluation.

Intellectual (thinking) skills: application

On successful completion of the module, students will be able to:

- Apply Kolb’s model of learning to the design of a teaching programme.
- Illustrate, using phonetics, the problem of sigmatism in children.

Intellectual (thinking) skills: analysis

On successful completion of the module, students will be able to:

- Appraise the key issues of market segmentation in a brewing industry case study.
- Compare Hofstede’s theories of culture with those of Trompenaars and Hampden-Turner.
Intellectual (thinking) skills: synthesis

On successful completion of the module, students will be able to:

- Create a set of criteria to assess Home Office implementation of immigration rules.
- Design an engine component that conforms to the following criteria…

Intellectual (thinking) skills: evaluation

On successful completion of the module, students will be able to:

- Explain the reasoning behind their allocation of scarce resources in the treatment of patients in an Accident and Emergency setting.
- Prioritize conclusions they reached from an analysis of paint techniques, giving reasons.

Practical skills (=subject-specific)

On successful completion of the module, students will be able to:

- Express themselves in writing for different professional and academic audiences.
- Employ appropriate ICT skills in order to forecast demographic trends.
- Use web-creation tools to produce an interactive website suitable for use by young schoolchildren.

Key/transferable skills (=generic)

On successful completion of the module, students will be able to:

- Work effectively as part of a team.
- Reflectively evaluate their own learning and personal planning processes.

4. GOOD PRACTICE IN WRITING LEARNING OUTCOMES: SUGGESTIONS

Open-ended learning outcomes

Not all learning is pre-planned: in many subjects (especially creative ones), students are expected to choose their own route through a module, and you can devise open-ended learning outcomes to reflect this. For example, you could say that students are expected to be able to:

- draw creatively on experience to devise work which integrates art forms
- apply theory critically to analyse their professional experience
- evaluate the impact of their clinical intervention
- use a self-reflective approach to devising, developing and delivering project work.

Avoiding plagiarism

Learning outcomes can also be used to help avoid plagiarism:

- Learning outcome: Students will be able to demonstrate the origins of their ideas by referencing sources used in their work.
Assessment criterion: Accurate use of the standard referencing styles within the text for all sources used.

5. SUGGESTED STEPS IN WRITING ASSESSMENT CRITERIA

1. Consider which learning outcome is being assessed (e.g. demonstrate critical awareness of social housing issues)
2. Consider the assessment task set (e.g. present a self-made artefact to the group to represent your critique of social housing issues)
3. Work out requirements for successful performance of the assessment, or the attributes required for this (e.g. clarity and fluency in terms of presentation; logical argumentation and marshalling of information in terms of content)
4. If necessary, specify the range to clarify contextual factors and the level (e.g. demonstrate critical awareness of social housing issues since the introduction of right-to-buy in the UK, making appropriate reference to the recommended reading for the module)
5. Focus on what is essential and categorize the requirements or attributes into clearly worded criteria
6. Check that the criteria are measurable or assessable in valid and reliable ways and that the criteria are clear and unambiguous (e.g. ask colleagues to read the criteria to see if they interpret them in the same way)
7. Repeat steps 3, 4, 5 and 6 until fully satisfied.

6. USING ASSESSMENT CRITERIA TO MOTIVATE STUDENTS

In order to motivate students further, it can be helpful to use grading assessment criteria: while your learning outcomes have established the minimum requirement to pass a module, and can be linked to the minimum standard to fulfil a particular assessment criterion, grading criteria indicate what a student must demonstrate to achieve a higher grade. You will then have a set of statements to help you differentiate the level of a students’ performance. The idea behind this is that, rather than focusing on the threshold level stated in the outcomes, students can see the criteria for a First, or a Distinction, and will shift their focus to the highest level. For example:

<table>
<thead>
<tr>
<th>Learning Outcome:</th>
<th>Assessment criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>By the end of the module, students will be able to:</td>
<td>Fail</td>
</tr>
<tr>
<td>use evidence appropriately in support of an argument.</td>
<td>Unsubstantiated or invalid conclusion, based on anecdotes and generalizations only</td>
</tr>
<tr>
<td>Domain</td>
<td>AVOID words like:</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>i Knowledge and Understanding</td>
<td>Know Really Know Become acquainted with Be interested in Learn the basics of</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Understand Really understand Believe Obtain a working knowledge of</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>ii Cognitive Skills</td>
<td>Have information about</td>
</tr>
<tr>
<td>Application (apply)</td>
<td></td>
</tr>
<tr>
<td>Analysis (recognise)</td>
<td>Appreciate Have a good grasp of Be aware of</td>
</tr>
<tr>
<td>Synthesis (integrate)</td>
<td>Acquire a feeling for</td>
</tr>
<tr>
<td>Evaluation (judge)</td>
<td>Be familiar with Realise the significance</td>
</tr>
</tbody>
</table>

### Goals

#### Descriptions
Goals are broad, general statements of intended outcomes in knowledge or skills. Your goals may include cross-disciplinary aims such as enhancing students' critical thinking skills, ability to communicate effectively, or appreciate of cultural diversity.

One goal will often have more than one objective.

#### Advantages
Written course goals can serve many purposes, including:

- aligning individual

### Instructional Objectives

Instructional objectives can be thought of as what you, the professor, hope to accomplish with your students in this class.

Instructional objectives will include the topics to be covered and how you will engage your students in processing that content.

### Student Learning Outcomes

Student learning outcomes are specific statements of what students should be able to do as a result of this instruction.

They should be written in terms of observable, measurable behaviors; or in the instance of affective objectives, written in terms of indicators of growth, rather than quantitative measures.

Clearly stated learning outcomes allow students to be fully aware of what you are expecting them to be.
courses with the goals of a program of study

assuring continuity and minimal overlap among courses within a program of study

documenting curriculum coverage to meet program accreditation or graduate licensure requirements

sessions.

They can be used to design tests and other assessments.

Informing students of your objectives help them prioritize information according to what you think is important for them to learn.

able to do with the content they are learning.

For example, when studying varied learning theories, they know whether they are expected to be able to match the theorists to their major theories, cite research studies supporting the theories, or design instructional sequences based on those theories.

| Sample verbs: | understand, learn, develop, recognize, appreciate | present, lecture, discuss, illustrate, explore, consider | translate, evaluate, apply, diagram, summarize |

<table>
<thead>
<tr>
<th>Examples:</th>
<th>This course is intended to:</th>
<th>In this class we will:</th>
<th>As a result of successfully completing this course, you will be able to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Derived from EDAD 6640/EDCI 6758 offered Spring, 2002. Instructor: Dr. Nancy P. Hunt)</td>
<td>a) provide an overview of the issues, principles, and practices associated with effective college teaching</td>
<td>a) discuss, analyze, and apply a wide variety of traditional, contemporary and emerging models and styles of college teaching.</td>
<td>a) write learning objectives representative of each level within Bloom's Taxonomy of Cognitive Objectives</td>
</tr>
<tr>
<td></td>
<td>b) assist current and future faculty in post-secondary institutions increase their teaching effectiveness</td>
<td>b) explore the teaching and learning implications associated with the many dimensions of student diversity</td>
<td>b) compare and contrast behavioral, cognitive, and social interaction models of learning</td>
</tr>
<tr>
<td></td>
<td>c) increase recognition of the scholarship of teaching and learning</td>
<td>c) discuss and evaluate strategies for the improvement of college teaching effectiveness.</td>
<td>c) design and deliver a lesson which addresses a variety of student learning style and sensory processing preferences</td>
</tr>
</tbody>
</table>

Checklist for writing learning outcomes

(✓) Focus on outcomes, not processes.

(✓) Use an action verb.
Avoid vague verbs such as know and understand.  
Use only one action verb per learning outcome.  
Action verbs should reflect the level of learning required.  
Include no more than three outcomes per major topic.  
Outcomes are observable and measurable.

Benjamin Bloom is credited with identifying the Taxonomy of the Cognitive Domain. There are six levels that become increasingly more complex.

### Cognitive (Knowledge) Domain

<table>
<thead>
<tr>
<th>Level</th>
<th>Action Verbs</th>
<th>Outcome Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>Recite, List</td>
<td>By the end of the chemistry program, students will be able to list all of the elements on the Periodic Table.</td>
</tr>
<tr>
<td>Comprehension</td>
<td>Translate, interpret, predict, generalize, identify examples</td>
<td>By the end of the French program, students will be able to translate a paragraph of text from English to French.</td>
</tr>
<tr>
<td>Application</td>
<td>Apply, rewrite</td>
<td>By the end of the BIS program, students will be able to apply basic Web development skills</td>
</tr>
<tr>
<td>Analysis</td>
<td>Analyze, dissect, resolve, solve, diagnose, investigate</td>
<td>By the end of the special education program, students will be able to diagnose learning disabilities in K-12 settings.</td>
</tr>
<tr>
<td>Synthesis</td>
<td>Create, synthesize, write</td>
<td>By the end of the art program, students will be able to create at least 12 original works in their medium.</td>
</tr>
<tr>
<td>Evaluation</td>
<td>Evaluate, judge, rate, appraise</td>
<td>By the end of the music education program, students will be able to judge student performances.</td>
</tr>
</tbody>
</table>

Other domains commonly used as a reference in teaching are the Affective Taxonomy and the Psychomotor Taxonomy. The affective domain includes a focus on students’ attitudes, values and dispositions. These outcomes are a little more difficult to measure; however, it is possible, and many disciplines are including these in their national standards. In fact, some of these Student Learning Outcomes appear in the Bulletin as part of the CMU Mission and goals (e.g., Students should develop respect and understanding for people from all backgrounds and cultures and be able to engage in constructive discussion of significant social and ethical issues.) as well as part of the General Education Requirements (e.g., Develop intellectual concerns to include a cross-cultural perspective through the study of diverse cultures).
<table>
<thead>
<tr>
<th>Affective (Values, Dispositions) Domain</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level</strong></td>
</tr>
<tr>
<td>Receiving</td>
</tr>
<tr>
<td>Responding</td>
</tr>
<tr>
<td>Valuing</td>
</tr>
<tr>
<td>Organization</td>
</tr>
<tr>
<td>Characterization by a value complex</td>
</tr>
</tbody>
</table>

The Psychomotor Taxonomy focuses on the development of students’ physical abilities and skills. These Student Learning Outcomes may include performances, skill in a sport, typing skills, painting, playing an instrument, manipulating another person’s limbs during physical therapy and demonstrating a dissection.

<table>
<thead>
<tr>
<th>Psychomotor (Skills) Domain</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level</strong></td>
</tr>
<tr>
<td>Perception</td>
</tr>
<tr>
<td>Set</td>
</tr>
<tr>
<td>Guided Response</td>
</tr>
<tr>
<td>Response Type</td>
</tr>
<tr>
<td>--------------------</td>
</tr>
<tr>
<td>Mechanical Response</td>
</tr>
<tr>
<td>Complex Response</td>
</tr>
<tr>
<td>Adaptation</td>
</tr>
<tr>
<td>Origination</td>
</tr>
</tbody>
</table>