Writing a Goal-centered Syllabus

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Some guiding questions

What is the purpose of a syllabus?
Who is it for?
How can it improve the process of learning?
What is the purpose of a syllabus?

What kind of imagery comes to mind? Is it like a work of art? An architecture’s drawing?
Who is it for:
Consider the audience

In a core course the audiences include:
- Students – of widely diverse background and preparation
- Instructors (GTAs are likely in a science lab) – including contingent faculty
- Evaluators – including those evaluating the course for transfer
- Administrators
Three Threads

My concerns:

– Lack of understanding of what university expects from core courses
– Need to communicate with instructors about these goals
– Making syllabus learner-centered

Parks & Harris (2002)- Syllabus as:

– Contract
– Permanent record
– Aid to student learning
Dissertation

No evidence of transmission of university goals for general education science to either instructors or students.

Few could articulate any of the goals for natural science at Mason. Few instructors could point to specific activities, assignments or lectures that directly addressed learning goals.

Students questioned reasons for these being required, and while they felt ‘broadening’ was the reason, could not list specific university goals.

Boiler plate goals, copied and pasted into the syllabus are not particularly effective.
Some issues

– Multiple section syllabi
– General education goals (set by the university)
The Big Question

What will students take away from your course?
- Preparation for the next step in their education
- Lifelong learning
- Critical thinking skills
- Overview of a field of study

Write down one key thing your course should do for students
- Learner-centered goal
On the note card, write down several learning goals for a course you teach or expect to teach.

See if you can select at least one big idea, something you hope will stick with students long after they have forgotten details from your course.
Goal-centered syllabus – Where big ideas “live”

Course overview
Course goals
Activities and assessments
Essential elements

Course description
Course goals
Helpful connectors to university services
Grading policies
Schedule
Due dates
Rubrics
Course overview

How did the solar system, all the planets, asteroids, comets, and moons, come to be? How is our understanding of the process challenged or changed by the discovery of hundreds of planetary systems orbiting other stars?

General education (core) science labs have a primary goal of asking students to participate in the process of scientific inquiry.

In this course you will examine the theory of the formation of the solar system and consider how exoplanet discoveries both challenge and deepen our understanding of how our own solar system came to be.

This is the laboratory portion of the introductory course, Solar System astronomy and is designed to pair with the Astronomy 111 lecture course. The main focus is on looking at how astronomers learn about bodies in the solar system and test the current theory of solar system formation.
Starting at the center - Putting goals first

What are the goals for your course?
Where does this fit in the bigger context of their education?
How might they benefit from the course?
Where will the main learning take place?
Setting goals

Core courses

- Goals for categories are at university level
- Course level goals – specific content and concepts

Content goals – what does course need to include?

Instructor-centered goals – how can what needs to be taught be fit into schedule?

Learner-centered goals – what will students learn and how will we and they know they learned it?
**Natural science goals (GMU):**

The general education natural sciences courses engage students in scientific exploration; foster their curiosity; enhance their enthusiasm for science; and enable them to apply scientific knowledge and reasoning to personal, professional and public decision-making.

To achieve these goals, students will:

1. Understand how scientific inquiry is based on investigation of evidence from the natural world, and that scientific knowledge and understanding:
   - evolves based on new evidence
   - differs from personal and cultural beliefs
2. Recognize the scope and limits of science.
3. Recognize and articulate the relationship between the natural sciences and society and the application of science to societal challenges (e.g., health, conservation, sustainability, energy, natural disasters, etc.).
4. Evaluate scientific information (e.g., distinguish primary and secondary sources, assess credibility and validity of information).
5. Participate in scientific inquiry and communicate the elements of the process, including:
   - Making careful and systematic observations
   - Developing and testing a hypothesis
   - Analyzing evidence
   - Interpreting results
How would this look as a learner-centered goal?

Participate in scientific inquiry and communicate the elements of the process, including:

- **Making careful and systematic observations**
- **Developing and testing a hypothesis**
- **Analyzing evidence**
- **Interpreting results**

Students will:

- Demonstrate that they can make careful and systematic observations
- Develop and test a hypothesis
- Analyze evidence (or data) with respect to whether or not it supports a hypothesis
- Interpret the results of an investigation and explain the reasons behind their interpretation
- Evaluate the hypothesis in light of the collected evidence
Where will this happen in the course?

1. Demonstrate that they can make careful and systematic observations
2. Develop and test a hypothesis
3. Analyze evidence (or data) with respect to the hypothesis
4. Interpret the results
5. Evaluate the hypothesis in light of the collected evidence

1,2 Lab 3 Planetary motion
3,4,5 Lab 5 Solar system formation
1,2,3,4 Lab 7 Reflectance spectroscopy
1,2,3,4 Lab 8 Cratering on Mars
1,2,3,4,5 Lab 10 Explore an exoplanet

Final project presentation involves communicating the results
<table>
<thead>
<tr>
<th>Lab 1 Solar system walk</th>
<th>Lab 4 Fundamental properties of matter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab 2 Celestial sphere</td>
<td>Lab 6 Properties of light</td>
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</tbody>
</table>

Lab 9 – a citizen science project - is devoted to helping students see that at some level anyone can contribute to the science process by gathering (and in some sense) interpreting data. Whether it is identifying plumes of gas and dust erupting from the south pole of Mars, or classifying galaxies by shape, there is room for the non-scientist to contribute in a meaningful way.
Writing learning goals - Noyd

- Describe what students will learn and will be able to do
- Are actionable, visible, and measurable
- Are clear and understandable to students as well as instructors
- Have an appropriate level of generality
- Require high levels of thinking and learning

- Are developmentally appropriate
- Lead to authentic, motivating tasks
Solar system formation lab goals

Student learning outcomes—
Students will be able to list events in the timeline for solar system formation in order.

Students will analyze characteristics of planets and their motion and categorize them by whether they support the theory of solar system formation or not.
Students will participate in the process of scientific inquiry – analyze evidence and interpret results

<table>
<thead>
<tr>
<th>Skills needed –</th>
<th>Skills developed by</th>
<th>Skills assessed by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students will be able to order events in the formation for the solar system (pre-lab reading and quiz)</td>
<td>Reading prelab material</td>
<td>Pre-lab quiz</td>
</tr>
</tbody>
</table>
| Students will compare data for solar system bodies to a list of observations of expected characteristics that fit the basic theory of solar system formation | Adding data to table in lab report – including whether or not the object aligns with expected observations. | Lab report:  
Answer key for particular objects  
Rubric for question responses |
<table>
<thead>
<tr>
<th>Due before lab</th>
<th>Pre-lab for week of October 16</th>
<th>Pre-lab readings and video on Solar System formation</th>
<th>Quiz – Solar system formation on Blackboard</th>
</tr>
</thead>
</table>
| October 16    | Lab 5 – Solar System Formation | SLO 5 introduction to full formation theory which our investigations would be directed toward  
CLO 3 how scientists are learning about these objects | Discussion of the main things a theory of formation has to account for, and also of the things it has to explain aside from the basics of the theory  
Introduction to the on-line resources students will be using as they explore the large variety of solar system objects  
Visions and Voages excerpts about various missions and goals for specific planets | Short written report, graded by rubric  
Slide or short writing submitted on group page |
Creative examples

The promising syllabus (Hirsch, The Promising Syllabus Enacted: One Teacher’s experience in Communication Teacher)-

What this course promises you

How will you fulfill those promises

Conversation about how student and teacher will understand nature and progress of student’s learning
ECON 201 Online: Map of the Journey

What is Economics?
- What is macroeconomics?
  - What is the most compelling macro question you can think of?
  - Why is economics relevant to your life?
  - How do economists analyze issues?

Supply & Demand
- Where do prices come from?
  - What causes things to become more expensive or less expensive?
  - Why do some goods (e.g., fresh vegetables) vary more in price than others (e.g., Kraft Mac & Cheese)?

Alternative Ways of Addressing the Economic Problem
- How well is the economy doing in 2022? How do you know?
- How does the performance of the economy today compare with that of the 1980s, 1990s, & 2000s?

The Role of Money & the Financial System
- How do economies organize themselves?
  - How do economies decide what goods & services to produce, how to produce them, where individuals should work, and who should get what share of the economic pie?

A First Look at the Macroeconomy
- What exactly is money?
  - How does money work?
  - What makes money valuable?
  - How do banks & other financial institutions work?

How Does One Tell the State of the Economy?
- What is macroeconomics?
  - What factors influence the state of the economy?
  - What are the different ways of viewing macroeconomic issues?

The Role of Govt in a Market Economy
- What Determines the Level of Economic Activity?
  - What causes economic activity to speed up or slow down?

Stabilization Policy 1: What's the appropriate fiscal policy?
- What is fiscal policy?
  - How does it work?

Stabilization Policy 2: What's the appropriate monetary policy?
- What is monetary policy?
  - How does it work?
  - What caused the Great Recession?
  - What is the appropriate monetary & fiscal policy for the U.S. economy in 2022?