UW ChemE Universal Design for Learning Tips

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Executive Summary

The DEIA Committee, and now Undergrad Program Committee, started an initiative to support faculty in more easily implementing Universal Design for Learning (UDL) practices in our classes.

In order to achieve this, in Autumn 2023 we began presenting UDL tips for faculty at faculty meetings in quick, 1-minute formats. The tips generally included information about the goal of the practice, the method, and different options for implementation.

We have created this document to topically organize and compile these tips. This document will also provide information on ease of implementation (implementation complexity) for each of these tips (Low, Medium, High). Most are designed to be low-effort.

As the DEIA Committee, we recommend that the faculty implement these tips to create a more effective and equitable learning experience for students.
Summary of the Benefits of Universal Design for Learning

General Principles of Universal Design for Learning

UW Disabilities, Opportunities, Internetworking, and Technology (DO-IT) nicely summarized the principles of Universal Design for Learning as the following:

Universal design principles can be applied to many environments, products, and services, including learning environments, resources, and methods of instruction. Three principles have been established for the universal design of teaching and learning materials and activities that makes the learning goals achievable by individuals with diverse characteristics, including wide differences in abilities to see, hear, speak, move, read, write, understand English, attend, organize, engage, and remember. Universal design for learning (UDL) is achieved by means of flexible curricular materials and activities that provide alternatives for students with differing abilities. These alternatives are built into the instructional design and operating systems of educational materials—they are not added on after-the-fact.

The Center for Applied Special Technology (CAST) created a set of three principles with roots in cognitive neuroscience to underpin practices and curriculum for teaching and learning. The UDL principles are listed below.

- **Multiple means of engagement.** For purposeful, motivated learners, stimulate interest and motivation for learning. Three UDL guidelines under this principle promote the development of curriculum and instruction that includes options for perception; language, expressions, and symbolism; and comprehension.
- **Multiple means of representation.** For resourceful, knowledgeable learners, present information and content in different ways. Three UDL guidelines under this principle promote the development of curriculum and instruction that includes options for physical action, expressive skills and fluency, and executive functions.
- **Multiple means of action and expression.** For strategic, goal-directed learners, differentiate the ways that students can express what they know. Three UDL guidelines under this principle promote the development of curriculum and instruction that includes options for recruiting interest, sustaining effort and persistence, and self-regulation.

Significantly more details on UDL, as well as Universal Design as a concept more broadly beyond just learning environments, can be found in the link above.

Benefits to Faculty

- Students will be more engaged with the course.
- Student learning outcomes improve.
- Proactively account for differences between student learning styles, interests, and life circumstances that impact learning.
Benefits to Students

- Students who have different ways of learning and engaging will experience equal and increased ability to engage with, learn, and prove mastery in a course.
- Students will learn and retain content more and develop stronger interest in the content.
- Students will feel more supported by faculty through increased engagement and flexibility, increasing the sense of identity and belonging in the class, department, and discipline overall.
Homework Policies and Practices

Set Homework Deadlines to 10 pm.

- **Goal**: Encourage sleep and boundary setting and create equitable deadlines
- **Justification**: Engineering Education research (by Dr. Sarah Wilson and others) & in Dr. Alex Prybutok's experience shows that 10 pm deadlines are effective compared to other options. If you have a morning deadline, students will stay up all night doing the assignment. If you have a 5 pm deadline, some of them might have work/other obligations that make this challenging. Midnight means they're up late and lose sleep. Thus, 10 pm is most equitable and encourages sleep at a reasonable hour and models good boundaries
- **Implementation**: Set policy in syllabus/Canvas.
- **Implementation Complexity**: Low

Give 3 Free 24-Hour Extensions.

- **Goal**: support students by giving them flexibility and grace (for instances of illness, unexpected life circumstances, etc.), but in a budgeted way.
- **Method**: Give students the opportunity to turn in ~3 (or around half of the assignments) homework assignment 24 hours late with no questions asked/explanation needed. This helps students who are sick or when unexpected things come up, but the defined limit for the number of extensions helps students budget when to use them. It is generally good practice though to require students to ask for these extensions as they would need to communicate with their boss in a workplace for similar things.
- **Implementation**: There are varying ways to keep track of extensions that range in level of technical complexity. You can track extension usage via Canvas (such as through a fake assignment that does not affect their grade), or you ask them to submit extension requests via email and track the use in a spreadsheet.
Supporting Student Learning Outcomes

Utilize Homework and/or Exam Wrappers.

- **Goal**: Support student learning by encouraging concept review and metacognition (learning how to learn).
- **Method**: Create assessment that has students go through and correct mistakes (high level or in detail), and if a quiz/exam ask students if they got the outcome they hoped for and if not what they might do differently to study next time.
- **Implementation**: Require or make it a bonus assignment for 3-5 points back on assessment for incentive. Grade on completion/effort.
- **Implementation Complexity**: Low

Collect Muddiest Points.

- **Goal**: Get a sense of what topics/concepts students are struggling with the most to provide resources on or re-review.
- **Method**: Ask students at the end of the week what topic they’re struggling with the most.
- **Implementation**: Does not have to be for a grade. Can implement with or without tech (below). Review most commonly chosen topics after results are collected by posting additional materials online or taking a moment to review in class.
  - Tech-free option: use index card for tech-free
  - Tech option: PollEverywhere for tech version
- **Implementation Complexity**: Low
Course Engagement Practices

Use Live, In-Class Polling for Active Engagement.

- **Goal**: Encourage course participation, engagement, and thinking about course material as it’s being presented.
- **Method**: Take a poll of student responses to a quick conceptual question (ex: “Will this increase or decrease? What assumptions can be made?”). This generally takes ~1 min. This practice can also help gauge how effectively you as the instructor are explaining things and/or how the students are grasping concepts in real time.
- **Implementation**: This can be implemented either with or without tech (below) and either for in-class participation points or not. You can also use a mix.
  - Tech-free: Ask students for thumbs up/down or holding up fingers to vote on options.
  - Tech: Use software like PollEverywhere, which you can track & use as bonus points (these import directly to Canvas).
- **Implementation Complexity**: Low (tech-free option), Medium (tech option)

Manage Office Hours Effectively and Equitably.

- **Goal**: Ensure students are receiving support equitably during office hour time.
- **Justification**: Sometimes office hours can be dominated by a few students or those who might be most extroverted/comfortable asking questions, but that doesn’t mean others don’t have questions.
- **Implementation**: Take a tally of how many people are stuck on each homework problem and start on the one with the highest number of votes (students can vote more than once).
- **Implementation Complexity**: Low

Solicit Mid-Quarter Feedback.

- **Goal**: Get a sense of how the course is going before it is too late to make changes, and give students a sense of agency and having a say in their education.
- **Method**: Ask for feedback from students around the mid-point of the quarter, and share the summary of results. Indicate what if anything will change going forward (this can even be a small change, but it helps them feel heard).
- **Implementation**: There are tech and tech-free options.
  - Tech-free: Ask Ken Yasuhara or others from CTE to come in and spend a class collecting the feedback, but note that this takes up a class period.
  - Tech: Send out a google form (ask Dr. Prybutok for template).
- **Implementation Complexity**: Medium
Appendix: Templates and Resources

Homework and Exam Wrapper Templates.

Homework Wrapper Template

Due: One week after solutions are posted

For each homework assignment, you have the option of completing an associated Homework Wrapper, which can be submitted to the appropriate Gradescope assignment (e.g., “Homework 1 Wrapper”). The intent of the wrapper is to review concepts presented in homework, identify mistakes of understanding, and reinforcing learned material, without a substantial time burden on your already busy schedules.

To receive full credit, you must complete all parts of the wrapper, as well as demonstrate a thorough, thoughtful review of your work on the assignment. Completion of the Wrapper should take no more than 30 minutes and will earn you 3 points on your homework assignment. These points can be earned even if you received a perfect score on the assignment.

QUESTION 1. Identifying errors and reviewing concepts in the assignment. (3 pts)

Download the solutions to the homework assignment and compare your submitted answers to those in the homework solutions. For each problem, whether you received full credit on that problem or not, answer the following questions in the form of a table as shown below:

<table>
<thead>
<tr>
<th>Question Number</th>
<th>Did you get the problem completely correct?</th>
<th>If you did not get the problem completely correct, what is the (a) corrected way of thinking, (b) change you’d need to make, and/or (c) error you’d need to fix so that you would get the question correct?</th>
<th>Whether you got the question correct or not, what is the key point of the problem with regards to the course concepts? What can you learn from this problem (i.e., why was this given as a homework problem)?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td>Answer only if you did not get the problem completely correct.</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
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<td>...</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Exam Wrapper Template**

**Due: One week after solutions are posted**

For each exam, you have the option of completing an associated Exam Wrapper, which can be submitted to the appropriate Gradescope assignment (e.g., “Exam 1 Wrapper”). The intent of the wrapper is to review concepts presented in homework, identify mistakes of understanding, and reinforcing learned material, without a substantial time burden on your already busy schedules.

To receive full credit, you must complete all parts of the wrapper, as well as demonstrate a thorough, thoughtful review of your work on the exam. Completion of the Wrapper should take no more than 30 minutes and will earn you 3 points on your exam. These points can be earned even if you received a perfect score on the assignment.

**QUESTION 1. Identifying errors and reviewing concepts in the assignment. (2 pts)**

Download the solutions to the exam and compare your answers to those in the exam solutions. For each problem, whether you received full credit on that problem or not, answer the following questions in the form of a table as shown below:

<table>
<thead>
<tr>
<th>Question Number</th>
<th>Did you get the problem completely correct?</th>
<th>If you did not get the problem completely correct, what is the (a) corrected way of thinking, (b) change you’d need to make, and/or (c) error you’d need to fix so that you would get the question correct?</th>
<th>Whether you got the question correct or not, what is the key point of the problem with regards to the course concepts? What can you learn from this problem (i.e., why was this given as a homework problem)?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Only respond with a symbol or Y/N.</td>
<td>Answer only if you did not get the problem completely correct.</td>
<td>Answer in no more than 2 sentences.</td>
</tr>
</tbody>
</table>

1

2

3

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**QUESTION 2. Self-assessing study habits. (1 pt)**

Answer the following questions in terms of assessing how you prepared for this exam:

a) How did you study for this exam? In other words, how did you engage with the material/concepts the first time they were presented and review them?
b) Did you get the outcome you hoped to on this quiz? If not, what was your outcome and how did it differ from what you hoped for?

b) How might you study differently next time to prepare better (increase understanding, study more efficiently, etc.) for the exam?
Syllabus Policy/Language for 3 Free 24-Hour Extensions.

Courses where the policy of 3-free 24-hour extensions has been successfully used:

- CHEM E 375 (Prybutok)
- CHEM E 310 (Nance)
- CHEM E 325 (Bergsman)
- CHEM E 340 (Bergsman)
- CHEM E 465 (Prybutok)
- CHEM E 480 (Prybutok)
- CHEM E 467 (Prybutok)

Notes on differences between templates:

- **Request deadline**: For 310 they are required to submit the request 24 hours before the original homework deadline, but for 465 the extension request is due the same time/day as the original homework deadline

- **Request/Extension Tracking**: For 310 they request via email and are tracked via a spreadsheet, and for 465 they submit the request to a dummy assignment in Canvas with no value to their grade

- **Team assignments**: the 310 shows example language for how to implement this for when assignments are team-based
Emergency, Extenuating Circumstances, and Flexibility for Excused Late Assignments

In order to give you all some flexibility, grace, and best support you as your lives outside of class exist and continually evolve, we created the following late work policy.

Late homework will be accepted in following the cases described below.

- **Case 1:** You have 3 free extensions for the entire quarter. If you request one of these days you will be graded on 100% of the total points. You may not use the extension days consecutively. You must submit an assignment to the respective Homework’s extension assignment on Canvas to let us know you’ll be requesting an extension for that homework. The extension request is due at the same time the homework is due. Requesting an extension late will result in the use of two extensions (and if you don’t have two left, an extension will not be granted). The extension will give you until noon the next day for Homeworks 1-3 and 5-6 or up to 24 hours late for Homeworks 0 and 4 and will use one of your free extension days. Note that Homeworks 0 and 4 are the only ones with a 24 hour extension as a result of the other homework assignments preceding a quiz, and thus resulting in the need to release the solutions by noon the day prior to a quiz to aid in studying. Any homework not submitted by the time the solutions are released will result in an automatic 0.

- **Case 2:** You have run out of your three free extension days, or prefer not to use them. In this case, late homework will be assessed at a penalty of 25% per day as detailed below. You are encouraged to turn in your homework even if it is not done by the due date or use your extensions.
  - If you submit your homework one day late (24 hours—by 10:00 pm of the day after the deadline) you will only get 75% of the total points at most.
  - If you submit your homework two days late (48 hours—by 10:00 pm of the second day after the deadline) you will only get 50% of the total points at most.
  - If you submit your homework three days late (72 hours—by 10:00 pm of the third day after the deadline) you will only get 25% of the total points at most.
  - If you submit your homework more than three days late you will get zero credit.

- **Case 3:** In case of an emergency, you may submit a request to turn in homework late and penalty free if you send an email to Dr. Prybutok to discuss your homework submission.
Late HW Policy

Our goal with HWs is for you to learn and have the opportunity to turn in your best quality work. We aim to be as supportive and flexible as possible to do this. However, we have deadlines in place to keep the pace of the class, to be able to post solutions in a timely manner, and to be able to complete grading in a timely manner. We also want to make sure HW extensions are granted in an equitable way. You have three late day (24 h extension) credits to use during the quarter for HW assignments (this does not apply to exams). To use a late-submission credit on a team assignment, you will need agreement from all team members for submitting a team assignment after the deadline.

Excuses due to serious illness or family emergency will be handled on a case-by-case basis. Failure to raise the issue of serious illness or family emergency prior to the assignment due date will result in a zero for the assignment. This policy may be revised as needed at the discretion of the instructor.

1. Please notify Prof. Nance if you plan to use a late day and that you have late day credits available by receiving a confirmation response from Prof. Nance. These emails should go to Prof. Nance, and should cc both TA's. This is good professional/career development practice - equate it to asking for time off or negotiating project deadlines in your future job with your supervisor/boss.
2. If you have a serious illness or emergency, submit requests for HW due date extensions by 24 hours (before 9:30 am PDT Thursday mornings) before the HW deadline. If you have an emergency that necessitates asking within that 24 hour window, please email us so we can work with you.
3. If you have not gotten an approval of a HW extension based on #1-2 above, and you turn in a HW late, you will receive a late penalty of a 20 point loss for each day the HW is late.
4. HW solutions will be posted on Mondays therefore anything turned in after solutions are posted will receive a grade of zero.
5. Exceptions: HW 4 and HW 8 are due the Friday before a Monday exam and will not have the opportunity to submit late assignments. HW solutions for those HWs will be posted on Friday to best help you prepare for the exam Monday. If you submit late for HW 4 or HW 8, the point penalty described in #3 will apply. Please email us if you have an emergency so we can work with you.

After HW 4, you are moving into HWs that will have a team-based component and an individual component. For the team-based component, one HW assignment is submitted per team. To request a HW extension, all team members must agree to the request and be cc’d on the email request asking for an extension. All above policies apply.