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Tales from the MOOC Frontier: Institutional and Individual Experiences

eSynergy

BRINGING IT ALL TOGETHER

MN eLEARNING SUMMIT™

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Minnesota eLearning Summit

July 30, 2013

University of Minnesota

Tales from the Frontier — Context

- Provost Karen Hanson asked for my service in academic year 2013 (50% time) acting as the “Faculty Liaison for eLearning Initiatives”
- I’d been experimenting with teaching flipped (Computational Chemistry http://pollux.chem.umn.edu/4021/)
- I’d spent 3 years on the executive committee of University of Minnesota governance, including 1 year as its vice-Chair and 1 as its Chair
- I was also serving on the executive committee of the University’s Academy of Distinguished Teachers

University of Minnesota — Context

- Office of eLearning created January 1, 2013. See http://www.academic.umn.edu/provost/elearning/oel.html for details
- History, mission, future plans: http://www.academic.umn.edu/provost/elearning/index.html
- For all things online, see also http://digitalcampus.umn.edu/
- Key initiatives: Provost's Request for Proposals to Digitally Transform Undergraduate Programs. Winners (9) announced April 2013 http://digitalcampus.umn.edu/transform/
- Contract signed with Coursera to provide 5 MOOCs to launch ~May 2013 https://www.coursera.org/minnesota

What's a MOOC?

- Massive Open Online Course
- Formally coined as a term in 2008, but burst onto scene in 2011 with 3 courses at Stanford that enrolled 100,000+ students
- Now 3 major US players: Coursera, Udacity, and EdX
- A MOOC is:

UMN MOOC Rocket Ride

November 14, 2012

Dear Colleague Letter:

While the discussion of the potential impact of MOOCs on U.S. higher education has often strayed to the hyperbolic, there is no question that a well crafted MOOC offers interesting pedagogical opportunities, and indeed the potential of MOOCs is only at the earliest stages of being explored.

Let me now assert: *A great university is one that bubbles with experimentation*, and *we* are certainly a great university. If you think that *you* might be interested in creating and experimenting with a MOOC, I'd like to hear from you. In my part-time role this year as Faculty Liaison for eLearning Initiatives in the Office of the Senior Vice President for Academic Affairs and Provost, I'm working to help align University resources with faculty initiatives so as to foster ongoing development of technology enhanced instruction and online learning.

UMN MOOC Rocket Ride

Late December, 2012

Touching base with Coursera, UMN is told:

[We'd love to work with you! Just FYI, we're about to hit our present capacity and perhaps stop taking partners for a while after our next batch. So, if you'd like to be *in* that next batch, please let us know — by mid-January — the names of 5 MOOCs that you will offer. They'll need to be ready to be formally announced (with introductory course pages) in mid-February, and to launch about the May 2013 time frame…]

Daphne Koller

This Train Is Leaving the Station

Do we want to be on it?

Yes!

How to Select MOOCs

- Develop carefully thought-out principles based on mission, values, market consideration, etc. (stay tuned…); consult broadly with governance and collegiate leadership teams.
- *Unless* you've got only 3 weeks over winter break
- Alternative model: Frantically permit a small cabal to identify people based on personal knowledge of teaching ability, past experience with online course(s), and susceptibility to arm-twisting
- Get the FLeLI to volunteer, too, so at least he'll be sharing the pain…

The UMN Stable

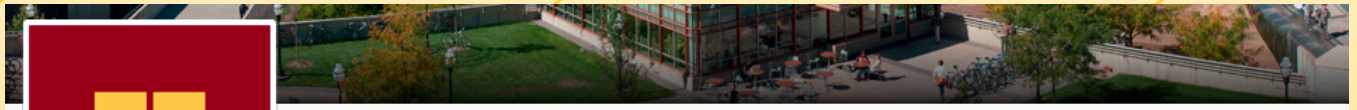
Karen Monson
Nursing

Michael Oakes
Public Health

Jason Hill
CFANS

Chris Cramer
CSE

Peggy Root
Vet School



University of Minnesota

The University of Minnesota is among the largest public research universities in the country, offering undergraduate, graduate, and professional students a multitude of opportunities for study and research. Located at the heart of one of the nation's most vibrant, diverse metropolitan communities, students on the campuses in Minneapolis and St. Paul benefit from extensive partnerships with world-renowned health centers, international corporations, government agencies, and arts, nonprofit, and public service organizations.

Introduction to Recommender Systems
Sep 3rd 2013

Interprofessional Healthcare Informatics
May 20th 2013

Social Epidemiology
May 31st 2013

Sustainability of Food Systems: A Global Life Cycle Perspective
Jun 14th 2013

Statistical Molecular Thermodynamics
Date to be announced.

Canine Theriogenology for Dog Enthusiasts
Date to be announced.

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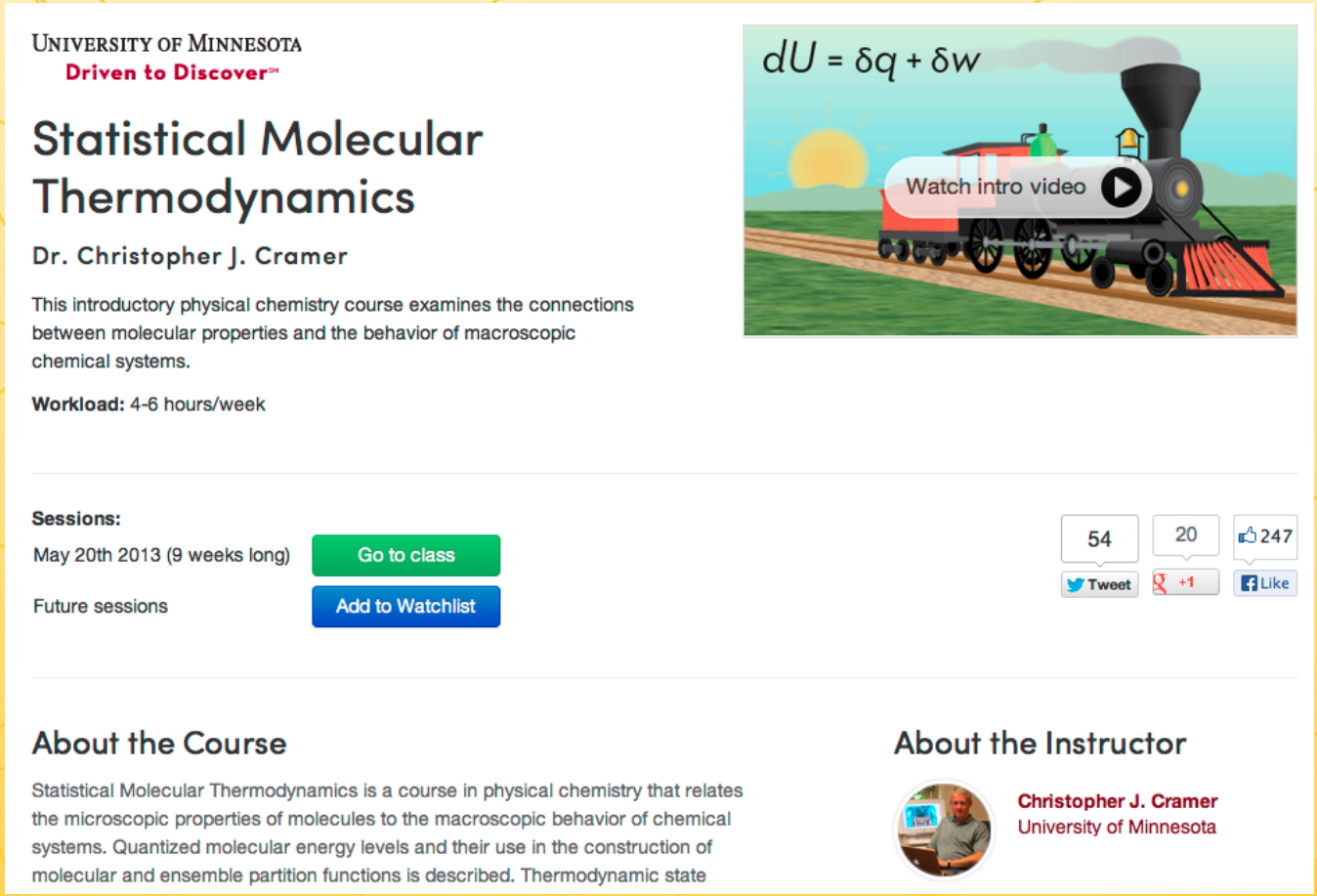
What We Had to Do in One Month



Title
Course Logo
1-Sentence Descr.
Workload
Intro Video
Start date/length
Course Descr.
Instructor Bio

also
Syllabus
Rec. Background
Sugg. Readings
Course Format
FAQ

It takes a village…

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The Village (The Tiger Team)

- Provostal oversight/support through Office of eLearning ($10K support to each MOOC)
- Project management through Office of Information Technology
- Consulting with Provostal Center for Teaching and Learning
- Each faculty member teamed with: course design expert, library expert, digital platform expert, videography support
- From institutional standpoint, enormous repurposing of staff effort on short notice. Design and build of central video studio from scratch.
- From faculty standpoint: no relief from “normal” assignments (notice too short) — labor of love…

What's in a Course? (My Course)

- Video lectures (narrated PowerPoint) with embedded self-assessments — organized as weekly content with a review
- Demonstration videos (16) — lots of fun…
- Machine-graded homeworks and final exam
- Read Me First, Course Schedule, What We'll Do Each Week, How To Get the Most Out of This Course, Learning from Us and Others, Grading Policy and Earning a Certificate, Resources, Getting Help
- Post Launch: Announcements (~weekly) and Forums

Video Lecture — Instructor

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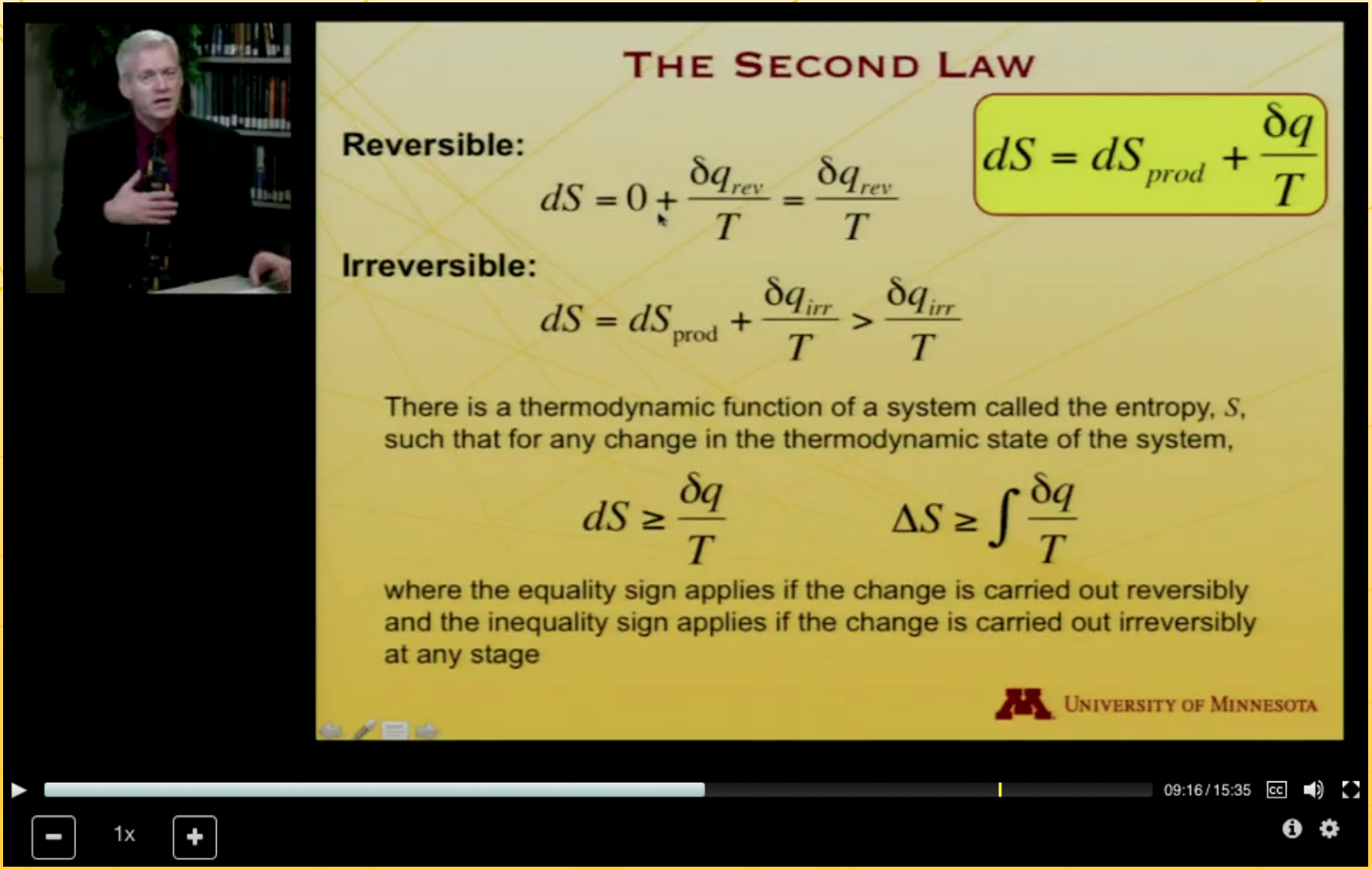
Video Lecture — Instructor + Slide



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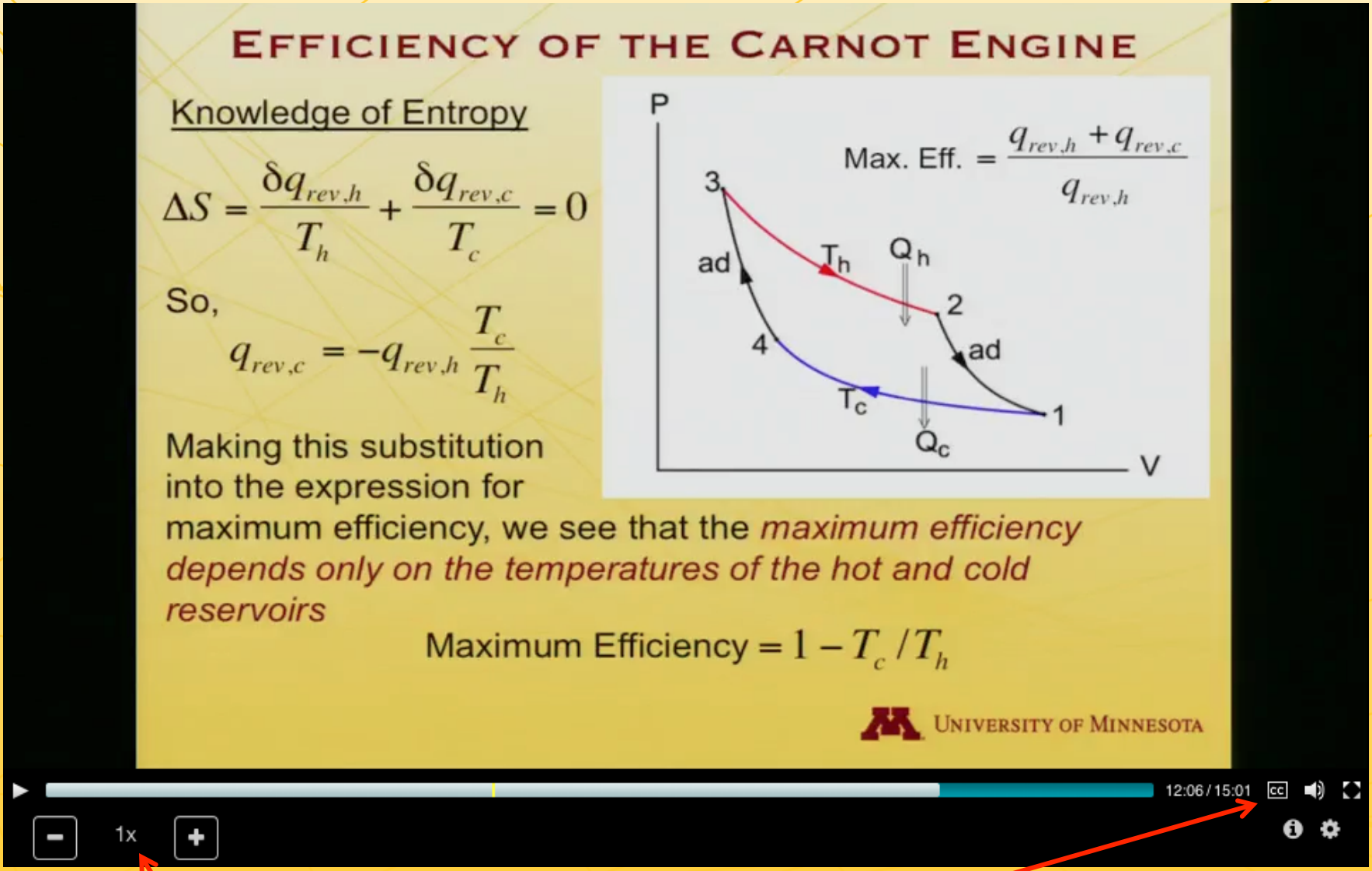
Video Lecture — Full Slide



Note: Coursera provides speed controls and closed-captioning

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Video Lecture — Self-Assessment

Consider the following endothermic reaction at 298 K and 1 bar,

$$\mathrm{NH_3(g)} \longrightarrow \frac{1}{2}\mathrm{N_2(g)} + \frac{3}{2}\mathrm{H_2(g)}.$$

Which of the following statements is true?

- ○ $\Delta_r \bar{H} = 0$
- ○ $\Delta_r \bar{H} < \Delta_r \bar{U}$
- ○ $\Delta_r \bar{H} < 0$
- ○ $\Delta_r \bar{U} < \Delta_r \bar{H}$

Submit

Skip

Video Lecture — Self-Assessment

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- $\Delta_r \bar{H} < 0$
- $\Delta_r \bar{U} < \Delta_r \bar{H}$

Continue

Explanation

Correct! ×

02:54 / 12:02 CC

1x

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Video Lecture — Self-Assessment

Consider the following endothermic reaction at 298 K and 1 bar,

$$\mathrm{NH_3(g)} \longrightarrow \frac{1}{2}\mathrm{N_2(g)} + \frac{3}{2}\mathrm{H_2(g)}.$$

Which of the following statements is true?

Explanation

Well, we can rule out $\Delta_r H = 0$ right away - the question states that the reaction is endothermic, so there is some quantity of heat transferred. Since it is endothermic, heat is transferred *from* the surroundings *to* the system, and therefore the sign of $\Delta_r H$ is positive, so $\Delta_r H < 0$ cannot be the correct answer. Also $\Delta_r H = \Delta_r U + P\Delta V$, and clearly ΔV is positive as we can see from the reaction: one mole of gas reacts to form two moles of gaseous products. So the proper answer is $\Delta_r \bar{U} < \Delta_r \bar{H}$.

Ok

$\Delta_r \bar{H} < 0$

$\Delta_r \bar{U} < \Delta_r \bar{H}$

Continue

Explanation

Correct!

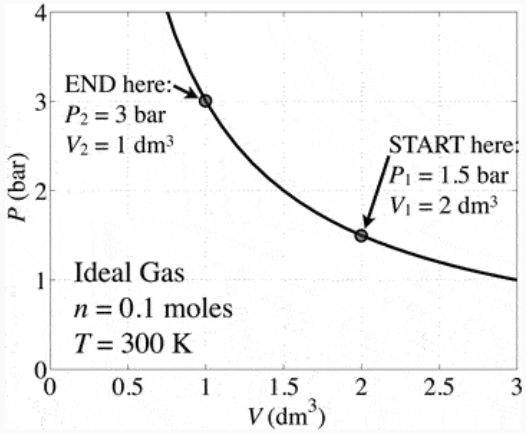
02:54 / 12:02

1x

Homework

Question 4

Consider the isothermal compression of 0.1 moles of an ideal gas at 300 K from $(P_1 = 1.5 \text{ bar}, V_1 = 2 \text{ dm}^3)$ to $(P_2 = 3 \text{ bar}, V_2 = 1 \text{ dm}^3)$.

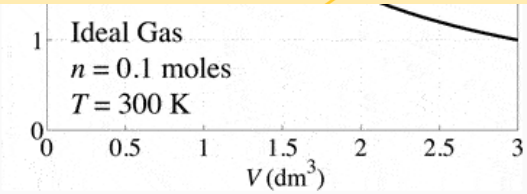


If the compression of the gas is carried out reversibly, which of the following statements is TRUE?

- ○ There will be no energy transferred as heat.
- ○ The change in the energy, U, will be positive.
- ○ The work required is the minimum for this compression.
- ○ The gas will cool (the temperature of the gas will go down).

1st time submitted for grade — may take subsequently as many times as desired — hard deadline

Homework — After Deadline



If the compression of the gas is carried out reversibly, which of the following statements is TRUE?

Your Answer		Score	Explanation
○ There will be no energy transferred as heat.			
◉ The change in the energy, U, will be positive.	✖	0.00	
○ The work required is the minimum for this compression.			
○ The gas will cool (the temperature of the gas will go down).			
Total		0.00 / 10.00	

Question Explanation

We know that it cannot be that there will be no energy transferred as heat. Why? Well, we know for an ideal gas the energy of the gas depends only on the temperature, so the total change in energy for this process must be zero since it is isothermal, i.e., $\Delta U = 0$. Because it is a reversible process, $w_{rev} = -q_{rev}$ and therefore,

$$w_{rev} = -q_{rev} = -RT\int_{V_1}^{V_2}\frac{dV}{V} = -RT\ln\frac{V_2}{V_1}$$

So clearly, heat must transfer in an amount equal and opposite to the work done. In this case, the heat transferred is from the system to the surroundings, so the sign on q is negative. There is no increase in energy, as we just discussed, so the energy increase cannot be positive. Also, the gas will not cool, even though $heat$ leaves the system - it does so only to maintain a constant temperature (the compression is isothermal). If the temperature remains constant, it will not cool. We do know from lecture video 5.2 that the work done in the expansion and compression of a gas is dependent upon the path taken. For a reversible isothermal expansion of an ideal gas, the minimum work done is that done along the reversible path.

Additional Facilitation

- All slides downloadable as pdf files (without background)
- All self-assessments downloadable as pdf files (with explanations)
- All homework downloadable as pdf files (work offline, enter answers when ready)
- Course Wiki page available (my students chose not to use it, perhaps because the forums were sufficiently useful (?))

Some Logistical Choices

- Content videos ~5 to ~15 minutes in length
- Demo videos at end of relevant content videos and also available separately
- Typically 1 self-assessment per content video
- 10-Question homework assignments involving both conceptual questions and those requiring mathematical work
- 20-Question final exam involving conceptual questions
- Video material made available two weeks *in advance of* "nominal" week, homeworks due one week *after* nominal week. Thus, 4-week window of typical discussion for any given week's material.

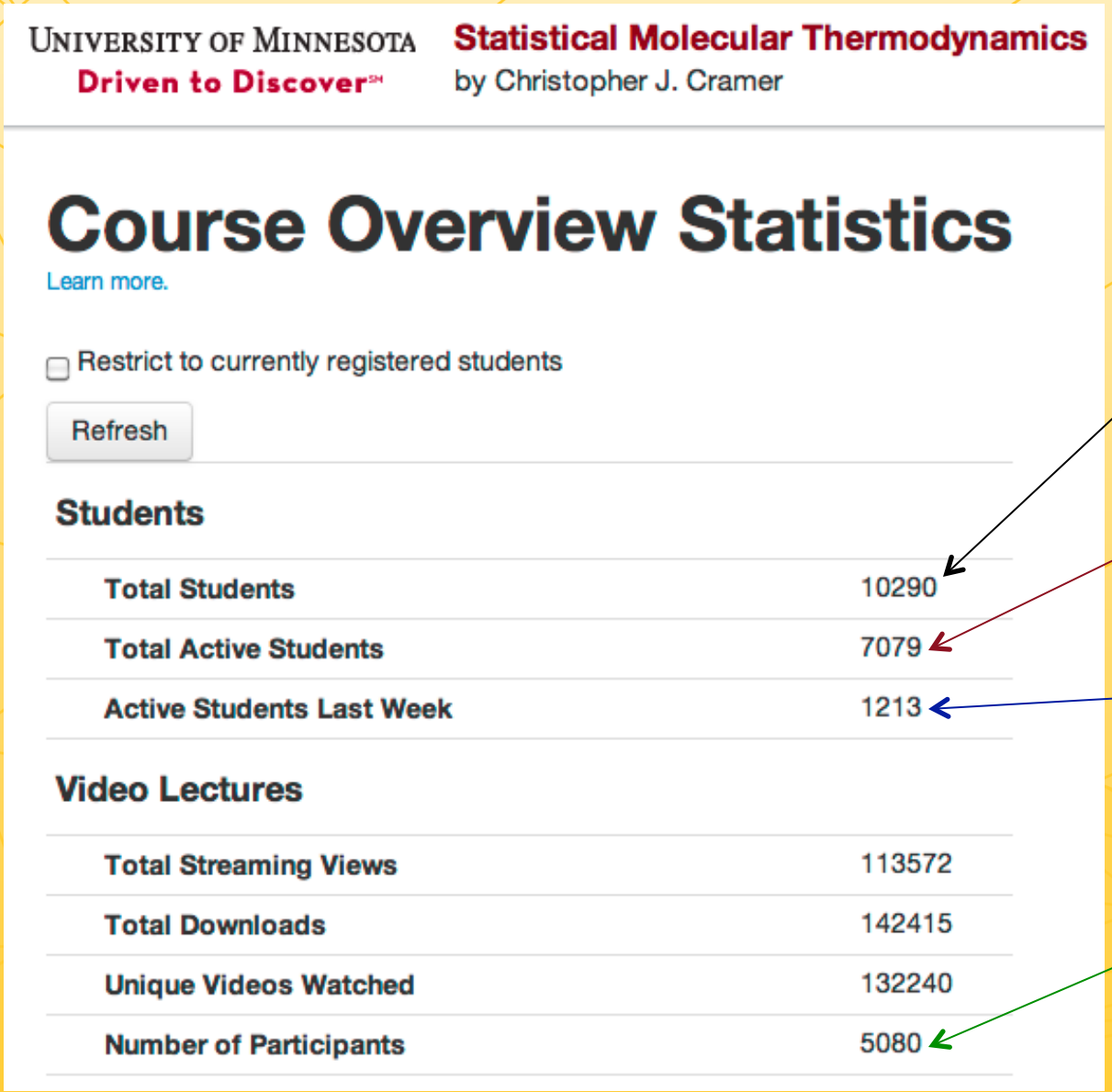
Instructor Challenges

- Content videos ~5 to ~15 minutes in length (not 1 hour??)
- Um, I'm talking to a camera…
- Which self-assessment *did* I plan for this video?
- Slides need to be visually professional and appealing
- Slides need to be much more effectively "stand-alone" because there will be no chance to correct for missing information on-the-fly based on real-time feedback
- Thousands of people are watching, so *every one of your errors* will *be found*; proofread, proofread, proofread…
- The planet has eager students in every time zone

Unexpected Things

- Enrollees pay no attention to suggested background
- All videos ripped to *YouTube* within minutes of release (but no self-assessments; those are done by Coursera platform)
- Roughly ½ of all students perfectly active, but uninterested in doing any graded exercises
- Those *doing* graded exercises just as focused on grading as tuition-paying students…
- Student demographics *fabulously* diverse
- Americans dominate enrollees, but small minority of active posters in forums
- Non-trivial number of students don't watch any videos!

Some Statistics



maybe I'll log in someday

I logged in at least once

I logged in last week (8)

I watched at least one video

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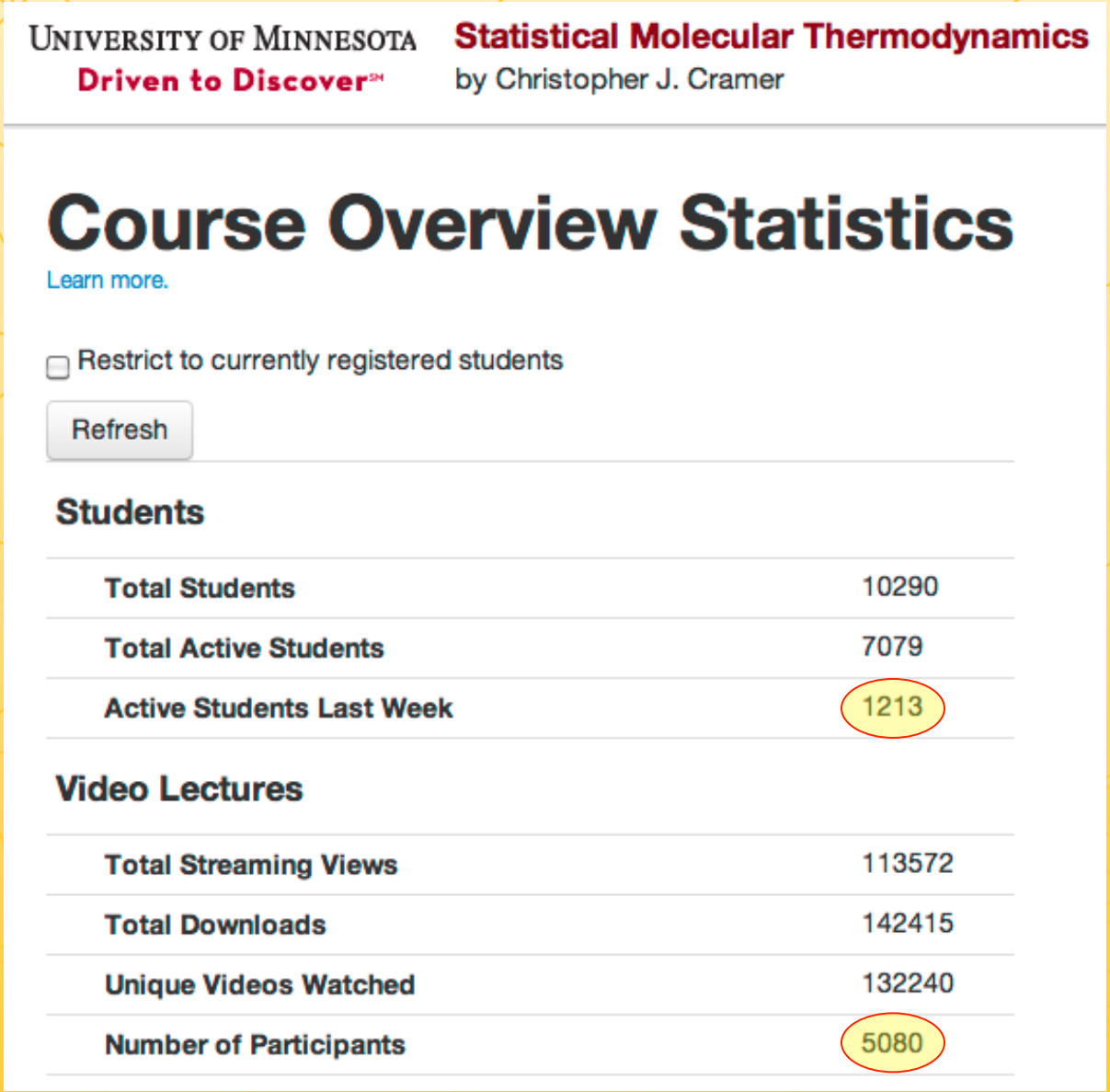
Some Statistics



671 students completed all graded exercises. Another 530 or so seem to have remained active throughout the course, which would be a *total* completion rate of about 24%.

The average score for those who finished all graded exercises was about 73%. 561 students passed, 367 with distinction (1 ace).

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Keys to Success

- Be active in the forums
- Be active in the forums!
- BE ACTIVE IN THE FORUMS!!!
- Be flexible; the students are nothing like your normal class
- Be patient; the students are nothing like your normal class
- Have high standards and realistic expectations
- Convey your enthusiasm at all times
- Provide feedback about course progress and *encourage* student participation in the forums
- Be active in the forums

A Critical Benefit

- I made 750+ forum posts. Some were in response to *very* good (and difficult) questions. Damn but I had to improve my knowledge of thermodynamics so as not to look stupid…

Keys to Institutional Success

- Advertise! (Tweet, reach out to media, tell Legislature, keep governance *in* the loop, transmit the excitement!)

Work the Public Relations Angle

<video deleted>

What's Next?

- UMN now soliciting proposals for "several" more MOOCs
- I would love to do 3 more myself, but almost certainly won't be able to, because:
- I plan to iterate SMT more times (~once per year?) and there is at present no UMN policy that rewards time devoted to MOOC instruction
- A colleague will teach our local Thermo this fall using my materials for the first 8 weeks and standard lecture for the next 6 weeks; we'll ask for student feedback
- Lots of data to mine from first iterations (performance, demographics, activities, etc.)

Those Principles I promised:

- A MOOC should *enhance* the reputation of the University by permitting it to *extend its mission-related activities* to audiences that would otherwise be difficult to reach. In addition to being accessible to a large audience, however, University of Minnesota MOOCs must present material having a level of rigor consistent with on-campus offerings covering similar subject areas, i.e., they must conform to those standards of *high academic quality* already in place.
- Very large MOOC enrollments make them a novel environment in which to experiment with *new pedagogical strategies and technologies*. Instructors will be *encouraged* to explore responsibly new schemes for (i) delivering content, (ii) engaging enrolled students, and (iii) assessing participants' achievement of learning outcomes.

Those Principles I promised:

- All MOOCs must be carefully evaluated *before* and *after* they are offered to assess the degree to which they contribute(d) to University goals. Where judged to be practical, successful new strategies associated with MOOC instruction may be *transitioned* to more traditional class sizes and environments.
- In order to maximize return on resources invested in MOOC creation, digital materials prepared for MOOCs will be developed in a manner that will most readily permit them to be *repurposed* for non-MOOC (i.e., local) blended and online courses as well.
- When prioritizing resources for MOOC investments, a primary consideration will be the degree to which currently enrolled students of the University will be likely to benefit from any given proposed MOOC undertaking.

Those Principles I promised:

- When selecting instructors to receive support for MOOC development, consideration of course quality and prior experience with on-line delivery will be used to prioritize resource allocation, although the latter is not an a priori requirement.
- Resources will be carefully *monitored* to ensure that investments in MOOC development do not unduly hinder the advancement of other educational initiatives throughout the system.
- If revenue-generating models associated with MOOCs develop, the University will act responsibly to maximize *return on investment* while remaining committed to the highest standards of *quality* and *institutional reputation*.

Roll Credits

<video deleted>