Mapping Waves, Bridging Shifts: Disciplinary Faculty Take on Whole Curricula

IWAC
June 13, 2014

Pamela Flash | WAC
Julia Robinson | Architecture
Leslie Schiff | College of Biological Sciences
Lisa Miller | Industrial & Systems Engineering,
Walt Jacobs | African American & African Studies

University of Minnesota, Twin Cities
2006: we need to evolve our approach to WAC...

- Prolonged perception of writing and content as discrete instructional areas

- Course-based vs. curriculum-based integration of writing/writing instruction

- Amplified questions about central administration’s fiscal support for writing instruction

- Uneven compliance with WI requirements / course recertification waylaid

- Disappointment in student writing
**2006 Question:** How can we ensure an intentional and sustainable infusion of relevant writing instruction into diverse undergraduate curricula?

**Answer:** By putting change in the hands of unit faculty. By engaging faculty in a process of unearthing, interrogating, implementing, and assessing discipline-specific writing values, practices and expectations.
create → implement → assess → create
Create Writing Plan

**SECTION I: CHARACTERISTICS OF WRITING?**

**SECTION II: WRITING ABILITIES?**

**SECTION III: CURRICULAR SEQUENCING?**

**SECTION IV: ASSESSMENT?**

**SECTION V: SUPPORT?**

**SECTION VI: PROCESS?**

Meeting #1

Meeting #2

Meeting #3

Meeting #4
University of Minnesota — Mechanical Engineering Curriculum

Math 1371 or Math 1271
Math 1372 or Math 1272
Math 2374 or Math 2263
Phys 1302W
Phys 1301W
AEM 2021
AEM 3031
Mats 2001
Mats 2002
Chem 1021
Liberal Ed
Biology
Writ. 1301

Math 2373 or Math 2243
L. Alg. & Diff Eq. 4 cr.
Multi-var Calculus 4 cr.
Lin. Alg. & Diff Eq. 4 cr.
Statics & Dyn. 4 cr.
Deform. Body Mech. 3 cr.

EE 3005 Fundamentals of EE 4 cr.
EE 3006 EE Lab 1 cr.
EE 4521 Stats, Qual, Reliability 4 cr.
Sys. Dyn. & Control 4 cr.

IE 4521 Stats. Qual. Reliability 4 cr.
ME 3281 Sys. Dyn. & Control 4 cr.
ME 3282 Design & Manf. I 4 cr.
ME 3283 Design & Manf. II 4 cr.

ME 3331 Thermal Sci I 3 cr.
ME 3332 Thermal Sciences II 3 cr.
ME 3333 Thermal Sci III 3 cr.
CSci 1113 Intro C/C++ 4 cr.

ME 3221 ME 4031W
ME 4054W
Design Projects
Design & Manf. I 4 cr.
Measurement Lab. 4 cr.
Design & Manf. II 4 cr.
Technical Elective #1 4 cr.
Technical Elective #2 4 cr.
Technical Elective #3 4 cr.

ME 11 Intro. to ME 4 cr.
Liberal Ed 3 cr.
Liberal Ed 3 cr.
Liberal Ed 3 cr.

Total number of credits for graduation: 128

*Must be taken A/F. Strongly encourage Biol 1009.

† Indicates concurrent registration accepted
Art History

**ARTH 1001: Introduction to Art History**
- ArtH3014W: Art of India
- ArtH3015: Art of Islam
- ArtH3017: Islamic Culture
- ArtH3461: Art Now
- ArtH3434: Art & the Environment
- ArtH3464: Art Since 1945
- ArtH3152: Art & Archaeology of Ancient Greece
- ArtH3162: Roman Art & Archaeology
- ArtH3172: Greek and Roman Art & Archaeology
- ArtH3182: Art & Archaeology of Ancient Egypt & Western Asia
- ArtH3302: Print Culture in Early Modern Europe
- ArtH3315: Age of Curiosity: Art & Knowledge in Europe, 1500-1800
- ArtH3013: Introduction to East Asian Art
- ArtH3020W: Buddhist Art & Culture
- ArtH3065: American Art
- ArtH3577: Photo Nation: Photography in America
- ArtH3311: Baroque Art in 17th Century Europe
- ArtH3312: 18th Century: Rococo to Revolution
- ArtH3335: Baroque Rome
- ArtH3655: African-American Cinema
- ArtH3921W: Art of the Film
- ArtH3012: 19th and 20th Century Art
- ArtH3484: Art of Picasso & the Modern Movement
- ArtH3422: Off the Wall: History of Graphic Arts in Europe & America
- ArtH3494: East/West, West/East

**ARTH 3971W: Major Project**

**ARTH 1002W: Why Art Matters**
- ArtH3014W: Art of India

**ARTH 1004W: Introduction to Asian Art**
- ArtH3655: African-American Cinema

**ARTH 1021W: Introduction to Film Study**
- ArtH3012: 19th and 20th Century Art
- ArtH3422: Off the Wall: History of Graphic Arts in Europe & America

**ARTH 5325: Art of the Aztec Empire**
- ArtH5801: Spoken Word & Painted Texts in the Americas
- ArtH5802: Art of the Inka and their Ancestors
- ArtH5775: Formation of Indian Art: 2500 BCE to 300 CE
- ArtH5776: Redefining Tradition: Indian Art, 400 to 1300
- ArtH5777: Diversity of Traditions: Indian Art, 1200 to Present
- ArtH5781: Age of Empire: Mughals, Safavid, and Ottomans
- ArtH5785: Art of Islamic Iran

**ARTH 5411: Gender & Sexuality in Art Since 1863**
- ArtH5413: Alternative Media: Video, Performance, Digital Art
- ArtH5417: Twentieth Century Theory & Criticism
- ArtH5466: Contemporary Art

**ARTH 5513: Heritage After Iraq & Afghanistan**
- ArtH5115: Hellenistic & Iranian Asia
- ArtH5192: Persia & the Ancient Iranian World
- ArtH5786: Theorizing City & Space in the Mediterranean & W. Asia
- ArtH5787: Visual Cultures in Contact... Ancient & Medieval Worlds

**ARTH 5501: Visual Culture of the Atlantic World**
- ArtH5302: Print Culture in Early Modern Europe

**ARTH 5576: Early Chinese Art**
- ArtH5766: Chinese Painting

**ARTH 5565: American Art in the Gilded Age**
- ArtH5575: Boom to Bust: American Art 1920s-1930s
- ArtH5577: Art of the Harlem Renaissance

**ARTH 5535: Baroque Rome**
- ArtH5655: African American Cinema

**ARTH 5422: Off the Wall: History of Graphic Arts in Europe & America**
- ArtH5454: Design Reform in the Era of Art Nouveau
- ArtH5484: Art of Picasso & the Modern Movement
- ArtH5422: Off the Wall: History of Graphic Arts in Europe & America
- ArtH5494: East/West, West/East
### List of expected writing abilities

<table>
<thead>
<tr>
<th>Number</th>
<th>Ability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Describe software or system processes accurately, clearly and illustratively, using appropriate structures.</td>
</tr>
<tr>
<td>2</td>
<td>Provide low-level code explanations such as comments accurately, concisely, and informatively.</td>
</tr>
<tr>
<td>3</td>
<td>Describe algorithms accurately and concisely, with appropriate structure, and appropriate balance between high-level characteristics and low-level details.</td>
</tr>
<tr>
<td>4</td>
<td>Write for specific audiences with appropriate tone, level of explanation, and accessibility.</td>
</tr>
<tr>
<td>5</td>
<td>Use appropriate structures (e.g., lists, visuals) cite appropriately, and integrate into the text.</td>
</tr>
<tr>
<td>6</td>
<td>Justify choices of design, algorithms, etc. persuasively, clearly explaining the reasons for the choice, any important alternatives, tradeoffs, etc.</td>
</tr>
<tr>
<td>7</td>
<td>Compare and contrast alternative solutions clearly, accurately, and insightfully, with appropriate level of detail and appropriate structure, diagrams, etc.</td>
</tr>
<tr>
<td>8</td>
<td>Present high-level (theoretical or technical) analysis clearly, accurately, insightfully, providing a high-level summary that focuses on the most important aspects of the problem or system.</td>
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<tr>
<td>9</td>
<td>Present low-level analysis or proofs rigorously, precisely, and accurate, with appropriate structure, flow of ideas, and careful attention to details.</td>
</tr>
<tr>
<td>10</td>
<td>Document/clearly articulate content accurately and concisely with an appropriate balance between high-level and low-level ideas, and appropriate structures.</td>
</tr>
<tr>
<td>11</td>
<td>Authentically reflect individuality though writing that shows the writer’s unique background, perspective, etc.</td>
</tr>
</tbody>
</table>

### Courses (1K-4K)

<table>
<thead>
<tr>
<th>Course</th>
<th>1901</th>
<th>1902</th>
<th>2011</th>
<th>2013</th>
<th>3003</th>
<th>3081W</th>
<th>3081</th>
<th>4061</th>
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</tbody>
</table>
create

implement

assess
## Writing assignments by course level

<table>
<thead>
<tr>
<th>Assignment Genres</th>
<th>3000 LEVEL</th>
<th>4000 LEVEL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 2 3 4 5 6 7 %</td>
<td>1 2 3 4 5 6 %</td>
</tr>
<tr>
<td>Worksheet/Problem Set</td>
<td>x x x x</td>
<td>x x x x</td>
</tr>
<tr>
<td>Informal Paper, 1-3 pg</td>
<td>x x x x x x x x</td>
<td>100%</td>
</tr>
<tr>
<td>Formal Paper, 1-3 pg</td>
<td>x x x</td>
<td>x</td>
</tr>
<tr>
<td>Formal Paper 4-10 pg</td>
<td>x x x x x</td>
<td>57%</td>
</tr>
<tr>
<td>Individual Presentation</td>
<td>x x</td>
<td>29%</td>
</tr>
<tr>
<td>Group Presentation</td>
<td>x x x</td>
<td>43%</td>
</tr>
<tr>
<td>Peer Review</td>
<td>x x</td>
<td>29%</td>
</tr>
<tr>
<td>Critical Reading ?s</td>
<td>0%</td>
<td>x x x x</td>
</tr>
</tbody>
</table>
Abilities communicated implicitly vs. explicitly

SDS = synthesizing disparate sources
IS = interrogating sources
RCW = results centered writing
GRM = grammatically accurate writing
ACE = analyze for cause and effect
RIV = recognize the importance of variability

higher order abilities?
<table>
<thead>
<tr>
<th>Interrogating Sources</th>
<th>Synthesizing Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-class activity on how to read a scientific paper</td>
<td>Finding relevant literature</td>
</tr>
<tr>
<td>Take home assignment + discussion critically reading a paper</td>
<td>Keeping track of key sources and conclusions</td>
</tr>
<tr>
<td>Multiple suggestions on discussions of papers for a range of students and goals</td>
<td>Constructing an argument using multiple sources</td>
</tr>
<tr>
<td></td>
<td>Synthesis workshop</td>
</tr>
</tbody>
</table>
## Rating upper-division writing of graduating majors

**August 2012**

<table>
<thead>
<tr>
<th>#</th>
<th>Criteria</th>
<th>2010 N=7</th>
<th>2012 N=9</th>
<th>2012 raters only</th>
<th>2012 writing specialist only</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Demonstrates an understanding of the importance of historical context.</td>
<td>0.67</td>
<td>0.81</td>
<td>0.74</td>
<td>1.00</td>
</tr>
<tr>
<td>2</td>
<td>Explains the context of historical events <em>through the use of primary sources.</em></td>
<td>0.68</td>
<td>0.64</td>
<td>0.63</td>
<td>0.63</td>
</tr>
<tr>
<td>3</td>
<td>Demonstrates an awareness of the particular nature, value, limitations, and incompleteness of historical sources.</td>
<td>0.29</td>
<td>0.53</td>
<td>0.59</td>
<td>0.38</td>
</tr>
<tr>
<td>4</td>
<td>Formulates and expresses viable historical research questions and hypotheses.</td>
<td>0.71</td>
<td>0.58</td>
<td>0.59</td>
<td>0.50</td>
</tr>
<tr>
<td>5</td>
<td>Engages in critical analysis of interpretive problems.</td>
<td>0.38</td>
<td>0.47</td>
<td>0.44</td>
<td>0.63</td>
</tr>
<tr>
<td></td>
<td>Engages in persuasive analysis of interpretive problems</td>
<td>0.55</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>6</td>
<td>Makes a persuasive and logically organized argument <em>that is supported by the evidence.</em></td>
<td>0.67</td>
<td>0.55</td>
<td>0.48</td>
<td>0.71</td>
</tr>
<tr>
<td>7</td>
<td>Articulates this argument in a thesis statement.</td>
<td>0.70</td>
<td>0.63</td>
<td>0.54</td>
<td>0.88</td>
</tr>
<tr>
<td>8</td>
<td>Explains the broader significance of the topic.</td>
<td>0.57</td>
<td>0.49</td>
<td>0.58</td>
<td>0.25</td>
</tr>
<tr>
<td>9</td>
<td>Identifies and summarizes some of the main arguments, evidence, and historiographical context of a scholarly work related to the question.</td>
<td>0.33</td>
<td>0.47</td>
<td>0.52</td>
<td>0.25</td>
</tr>
<tr>
<td>10</td>
<td>Communicates ideas in compelling and accessible prose.</td>
<td>0.80</td>
<td>0.75</td>
<td>0.74</td>
<td>0.75</td>
</tr>
<tr>
<td>11</td>
<td>Cites evidence accurately to support argument.</td>
<td>0.57</td>
<td>0.56</td>
<td>0.52</td>
<td>0.75</td>
</tr>
<tr>
<td>12</td>
<td>Uses a consistent citation style.</td>
<td>0.90</td>
<td>0.83</td>
<td>0.81</td>
<td>0.88</td>
</tr>
<tr>
<td>13</td>
<td>Writing is grammatically and mechanically correct.</td>
<td>x</td>
<td>0.75</td>
<td>0.74</td>
<td>0.75</td>
</tr>
</tbody>
</table>
After discussing rating results, faculty chose to restructure capstone project course sequence.

Based on these findings, the Undergraduate Studies Committee was charged with developing a strategy to improve the efficacy of the capstone project. The eventual outcome was a proposal to replace the 3959 – 4961 sequence with a new single-semester capstone course, the 4010 W Research Seminar (see Appendix III). Rather than the “open format” of the previous 4961 Major Paper, 4010 seminars are envisioned as small (20 students max), faculty-led “closed content” seminars, in which students are introduced to advanced research practices within the context of a theme chosen by the faculty instructor and drawn from her/his area of expertise. While each student in these courses will still be expected to develop an original research project based on her/his own interests, and to produce an original research paper of 20-30 pages at the conclusion of the semester, it is hoped that this “closed” format will help address some of the shortcomings of the 3959 – 4961 sequence.

From 3rd edition Writing Plan
Intentionally-sequenced infusions of discipline-relevant writing instruction are unlikely to occur automatically in undergraduate curricula but...

Engaging departmental faculty groups in data-driven discussions of writing-related assumptions and curriculum-wide writing instruction can...

--reduce burden on individual courses
--increase attention to curricular implications of writing instruction

...which can increase students’ ability to transfer relevant understanding between courses...

while at the same time increasing faculty willingness to “own” relevant writing instruction
Faculty conceptions of writing and writing instruction

Writing instruction (and assessment) within courses

Curricular transformation

Student conceptions of writing and writing instruction

Improved student writing

Writing-Enriched degrees
WEC’s spin on Activity Theory

Activity Theory: Vygotsky/Engeström

WEC adaptation
WEC in Architecture

For Session:
Mapping Waves, Bridging Shifts: Disciplinary Faculty Take on Whole Curricula

*Shifting Currents, Making Waves* - 12th International Writing Across the Curriculum Conference, June 12-14, 2014, University of Minnesota, Minneapolis

Julia W Robinson, WEC Liaison, Professor, School of Architecture
What is Writing in Architecture?

A

CONCEPT BOARD FOR DESIGN PROJECT

B

STUDENT PAPER ON URBAN DESIGN

C

STUDY OF URBAN PRECEDENT FOR A DESIGN PROJECT
What is Writing in Architecture?

- Architectural design as argument (supporting a particular approach)
- Architectural argument is both visual and verbal
- Argument involves
  - Thesis identification
  - Description of the situation
  - Analysis of critical factors
  - Interpretation and conclusion/ design
Appoint Liaison, Sample
Survey, meet, create Writing Plan

Writing Plan #1:
- TA Workshops
- New Criteria
- Course Exchange

Submit 1st ed. Plan (“start-up”)
Whole Faculty Committee
Rating #1

Submit 2nd ed. Plan (“two-year”)
Whole Faculty

Writing Plan #2
- TA Workshops
- Faculty Workshops
- Instructor Website
- Student Website

Submit Writing Plan #3
Whole Faculty and Committee
Rating #2
Rating of Papers and Boards

One method of city planning is a strict gridiron plan. This method starts with a square that is divided up into organized sections. The organized squares can be situated next to other organized squares to create an organized form for creating a city. When looking at this type of planning we see this in early towns like Tingad and nearly fifteen centuries later in Savannah Georgia. These two towns almost function as bookends to a similar idea. Between these bookends we see a lot of discussion as to where the idea of gridiron planning is derived. Regardless of the discourse, Tingad and Savannah show many important similarities.

Tingad was started as a colony in North Africa. It was part of the Roman Empire founded around 100 A.D. by Emperor Trajan. The town was a planned community and was created for soldiers of the Roman Army. The land was divided into squares and each square had lots with a structure amount of lots as referred to as a strict gridiron plan.
## Old & New Architecture WEC Criteria

### Architecture Writing Enriched Curriculum (WEC)
**Writing Criteria, March 2012**

<table>
<thead>
<tr>
<th>1</th>
<th>Describes designs and/or ideas about designs to establish basis for subsequent analysis and or interpretation.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Addresses ideas and/or designs in an “analytic way” by taking into account multiple perspectives and acknowledging subjectivity of ideas and/or potential biases of information.</td>
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<tr>
<td>3</td>
<td>Forwards an interpretive position about design and/or ideas about design.</td>
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<td>4</td>
<td>Describes and/or documents design process beginning with a statement of design’s intent.</td>
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<tr>
<td>5</td>
<td>Describes design process in a way that makes design logic (i.e., perceived intent, choices) explicit to others.</td>
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<tr>
<td>6</td>
<td>In presenting evidence, discriminates between scholarly arguments and unsubstantiated claims.</td>
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<tr>
<td>7</td>
<td>Critiques reasoning, method, or logic.</td>
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<tr>
<td>8</td>
<td>Identifies hierarchies and patterns of and within precedents.</td>
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<tr>
<td>9</td>
<td>Persuasively addresses target audience by using language and style suited to those readers’ concerns and backgrounds.</td>
</tr>
<tr>
<td>10</td>
<td>Documents sources using consistent citation formats so that readers can locate original materials.</td>
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<tr>
<td>11</td>
<td>Interprets and contextualizes references, ideas, environments and/or influences such that reader can answer the question. “Why should we care about this?”</td>
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<tr>
<td>12</td>
<td>Articulates question(s) that are of reasonable scope for the current project (i.e. they are adequately addressed)</td>
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<tr>
<td>13</td>
<td>Elaborates on “Why did they (other designers) do what they did?” and/or “Why did you (the student) do what you did?”</td>
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<tr>
<td>14</td>
<td>Conveys fresh insights into existing architectural debates, issues and problems.</td>
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<tr>
<td>15</td>
<td>Uses visual materials that strengthen and support written arguments by effectively demonstrating and explaining features of design or concept.</td>
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</tbody>
</table>

### Revised Writing & Communication Criteria, April 2013
**Criteria Targeted for Improvement / Bold (1, 6, 10 & 13)**

<table>
<thead>
<tr>
<th><strong>Forming a topic</strong></th>
<th>1.</th>
<th>Forms a thesis or proposition as a statement that is open to investigation and debate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.</td>
<td>Generates, refines, and reforms questions related to the thesis or proposition</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>3.</td>
<td>Searches broadly to locate sources that contain information relevant to the thesis or proposition</td>
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<td>4.</td>
<td>Identifies evidence accurately and thoroughly – whether verbal or visual</td>
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<td>5.</td>
<td>Evaluates, organizes, and assembles visual and verbal evidence into a hierarchy that explains their relative significance</td>
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<tr>
<td><strong>Analysis and Interpretation</strong></td>
<td>6.</td>
<td>Constructs arguments that are substantiated with appropriate evidence</td>
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<td>7.</td>
<td>Leverages multiple perspectives to support complex arguments</td>
</tr>
<tr>
<td></td>
<td>8.</td>
<td>Engages visual materials and verbal arguments in a dialogue that recognizes the autonomy of both lines of inquiry</td>
</tr>
<tr>
<td></td>
<td>9.</td>
<td>Draws inferences from the argument(s) that lead to synthesis</td>
</tr>
<tr>
<td><strong>Conclusion</strong></td>
<td>10.</td>
<td>Concludes with a summary or interpretation of the argument that develops, promotes, or advances the original thesis</td>
</tr>
<tr>
<td></td>
<td>11.</td>
<td>Discovers new ideas through the process of writing</td>
</tr>
<tr>
<td><strong>Mechanics</strong></td>
<td>12.</td>
<td>Uses language and style to persuasively address the target audience</td>
</tr>
<tr>
<td></td>
<td>13.</td>
<td>Documents verbal and visual sources using consistent citation formats so that readers can locate original materials</td>
</tr>
</tbody>
</table>
Course Presentation and Exchange
Course Presentation and Exchange

- Shared Experience
- Organized by semester
- Learned about all courses in relation to one’s own & to curriculum
- Saw relation between verbal and visual
- Gained buy-in
WEC in the College of Biological Sciences

June 2014
Leslie Schiff, WEC Liaison
CBS by the numbers

- 7 academic majors
  - Biology
  - Ecology, Evolution and Behavior
  - Biochemistry, Molecular Biology and Biophysics
  - Genetics, Cell biology and Development
  - Plant Biology
  - Microbiology (Medical School)
  - Neuroscience (Medical School)
- Students: Freshman class of 510
- Faculty
  - 143 CBS faculty
  - ~40 faculty Microbiology and Neuroscience
  - Faculty in related and clinical disciplines who mentor directed research projects
Curriculum map

- Vertical
- Draws from across the biological sub-disciplines
THE CBS WEC TIMELINE

**EEB Writing Plan**

- **S08**
  - F08
  - S09
  - F09
  - S10
  - F10
  - S11
  - F11
  - S12
  - F12
  - S13
  - F13
  - S14

### Survey, meet, create Writing Plan #1

- **S08**
- **F08**
- **S09**
- **F09**

### Implement Writing Plan #1:
- map/analyze writing instruction in lab courses, offer structured support to capstone

### Submit 1st ed. Plan ("start-up")

### Submit 2nd ed. Plan ("two-year")

### Rating #1

### Rating #2
Writing in Biology

Protocol

1. Sample lysis
   1. Preparation of lysate from cell culture
      1. Place the cell culture dish in ice and wash
      2. Aspirate the PBS, then add ice-cold lysis
      3. Scrape adherent cells off the dish using
      4. Maintain constant agitation for 30 min.
      5. Spin at 16,000 x g for 20 minutes in a
      6. Gently remove the tube from the centrifuge,

Thesis

Alexandra Schick
Dr. Bryan Williams Lab
University of Minnesota, Twin Cities
Department of Medicine-Pulmonary, Allergy, and Critical Care Division

Submitted to the College of Biological Sciences
and the University Honors Program
University of Minnesota
In partial fulfillment of the requirements
For the degree
Bachelor of Science
(summa cum laude)

The Effects of Agmatine on Inflammation and Nitric Oxide Production during Pseudomonas aeruginosa Lung Infections

Lab Notebook

Posters Presentations
Lab classes traditionally offer most opportunities for writing—target for our 1st plan

CBS typically required courses in the majors

Challenges: Role of TAs Shifting responsibility
One of the major goals of the first writing plan—collect data!

To understand how we are currently communicating goals and expectations around scientific writing in CBS laboratory courses.

To give faculty a comprehensive picture of writing instruction in CBS laboratory courses.
Where do students have the opportunities to develop specific writing abilities?

Translated writing abilities into 3-letter codes

Analyzed lab report artifacts for presence or absence of each code (assigned)

Compiled frequency of codes into “data”

What kind of ‘instruction’ are students receiving in printed materials?
Instruction towards CBS desired writing abilities

- Uses scientific paper format
- Presents precise information
- Figure legends are appropriately informative
- Critiques published work
- Derives conclusions based on synthesis of evidence
- Identifies gaps in scientific knowledge

Outcomes reminiscent of EEB analysis

Lab reports AND “Other” assignments from all majors, all levels
Capstone Rating of Writing: Average scores for Writing Abilities/Criteria

**SUFINCENT**
- AMC – Makes choices about which data to present visually
- FLI – Table titles and legends are informative
- RA – Critical analysis of published work
- RMI – Identifies alternatives to interpretation and approach

**INSUFFICIENT**

* = abilities that were most frequently implicit in lab courses
Sample comments from raters

Strengths of Student Writing
Strong synthesis
Strong on interpretation of sources
Clear establishment of gaps of knowledge

Weaknesses of Student Writing
Little to no critical analysis of published work
Data representation:
- They didn’t seem to know how data should look; Should look at published papers
- Figures were poor; legends were, at times, useless
- Under-evaluated data: fact upon fact upon fact

BUY-IN: This kind of teaching could only be done by faculty within the discipline
What next?
Data-driven evolution: 2nd ed. writing plan

• Tools (rubrics, TA-training, 5-minute workshops)

• Improve authenticity of data-related writing in the Foundations of Biology laboratory courses
  • Don’t ask students to write typical lab report sections if they are likely to simply re-iterate materials in the lab manual (materials and methods)
  • Focus more methodically on particular lab report sections
  • Use authentic literature as a model and promote CRITICAL READING
  • Leverage student writing samples
WEC in Industrial & Systems Engineering

June 2014
Lisa Miller, WEC Liaison
ISyE Department and Undergraduate degree established in Fall 2012:

- New faculty:
  - 4 Professors (2 on leave)
  - 1 Associate Professor (me)
  - 5 Assistant Professors

- New curriculum:
  - Only 1 class previously taught

- New students:
  - First class will graduate Spring, 2015 (12 students)
  - Quickly growing (50+ students in class of 2016)
What is Writing in Industrial & Systems Engineering?

- Directed at technical or business audience
- Define problem, develop model, describe solution approach, and justify recommended actions
- Incorporates visual representations of data, models, and insights
Statement of Work

Problem/Opportunity & Proposed Solution

Opportunity
Children's Lighthouse of Minnesota is a nonprofit organization dedicated to building an independent home to provide short respite breaks for families of children with life-limiting conditions, and an option beyond the hospital or home environment for compassionate hospice care at the end of life. This home would be the first of its kind in the

Cumulative Frequency Distribution of Time to Failure

Time to Failure (hrs)
How do we adjust the WEC process for a new program?

- Opportunity to embed writing instruction into initial curriculum and course design
- No students to survey or samples to assess

Survey (no students!)
Meet, create Writing Plan

Challenges:
- Minimal teaching experience
- Quiet discussions

Benefits:
- Early discussion of curriculum among faculty
- Writing top-of-mind in course development
- Improved faculty cohesion

Next month:
Submit 1st ed. Plan
First Year
(Fall or Spring Semester)

WRIT 1301 or WRIT 1401

Sophomore Year
Fall Semester
IE 1101 Foundations of ISyE
IE 2021 Engineering Economics

Spring Semester
IE 3521 Statistics, Quality, & Reliability

Junior Year
Fall Semester
IE 3011 Optimization I
IE 3522 Quality Engineering & Reliability
IE 3553 Simulation
IE 4011 Stochastic Models
IE 4551 Production & Inventory Control

Spring Semester
IE 3012 Optimization II
IE 4041W Senior Design

Senior Year
Fall Semester
IE 3012 Optimization II
IE 4511 Human Factors
IE 4541W Project Management

Spring Semester
IE 4041W Senior Design
# ISyE Curriculum Mapping Worksheet

Name: Lisa Miller  
Course Number and Title: IE 4041 – Senior Design

How will faculty introduce and/or develop these abilities in the ISyE undergraduate curriculum?

<table>
<thead>
<tr>
<th>ISyE Writing Ability</th>
<th>Mark the writing abilities you plan to address in this course (X)</th>
<th>For those abilities that you checked, jot down the writing activities/writing assignments you already use/could use in the course (reports, problem sets, professional communication, PowerPoint, posters, etc.)</th>
<th>Identify the level of ability with which you expect students to enter this course: Circle Novice (N), Intermediate (I), or Advanced (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Describe mathematical model in words</td>
<td></td>
<td></td>
<td>N  I  A</td>
</tr>
<tr>
<td>2. Write mathematical model in standard forms</td>
<td></td>
<td></td>
<td>N  I  A</td>
</tr>
</tbody>
</table>
| 3. Describe the steps of an algorithm in a clear, concise manner | X | Within project report – both early drafts and final draft | N  I  
Advanced |
| 4. Explain and justify insights and conclusions of complex analyses to non-technical audiences | X | Show examples (good and bad) in class  
Demonstrate in project report and project presentation. | N  I  
Intermediate |
| 5. Synthesize and summarize key points | X | Demonstrate in project summary and project presentation. | N  I  
Intermediate |
| 6. Create clear, impactful oral presentations with visual aids (e.g. PowerPoint) | X | Show examples (good and bad) in class  
Demonstrate in project presentations – both progress updates and final presentation.  
Feedback will be given between updates & final. | N  I  
Intermediate |
| 7. Write project documentation intended for a technical audience  
a. Mathematical model descriptions  
b. Algorithm description  
c. Mathematical solution  
d. Other necessary technical details | X | Project reports to be reviewed by mentor/faculty. | N  I  
Advanced |
### ISyE Curriculum Map

<table>
<thead>
<tr>
<th>Writing-Enriched Curriculum Qualities</th>
<th>ISyE Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Describe mathematical model in words</td>
<td>IE 201 - Foundations of Industrial and Systems Engineering</td>
</tr>
<tr>
<td>2. Write mathematical model in standard forms</td>
<td>IE 321 - Engineering Economics</td>
</tr>
<tr>
<td>3. Describe the steps of an algorithm in a clear, concise manner</td>
<td>IE 321 - Statistics, Quality and Reliability</td>
</tr>
<tr>
<td>4. Explain and justify insights and conclusions of complex analyses to non-technical audiences</td>
<td>IE 321 - Optimization I</td>
</tr>
<tr>
<td>5. Synthesize and summarize key points</td>
<td>IE 321 - Simulation</td>
</tr>
<tr>
<td>6. Create clear, impactful oral presentations with visual aids (e.g. PowerPoint)</td>
<td>IE 321 - Stochastic Models</td>
</tr>
<tr>
<td>7. Write project documentation intended for a technical audience</td>
<td>IE 321 - Production &amp; Inventory Control</td>
</tr>
<tr>
<td>a) Mathematical model descriptions</td>
<td>IE 321 - Optimization II</td>
</tr>
<tr>
<td>b) Algorithm description</td>
<td>IE 321 - Project Management</td>
</tr>
<tr>
<td>c) Mathematical solution</td>
<td>IE 4011 - Stochastic Models</td>
</tr>
<tr>
<td>d) Other necessary technical details</td>
<td>IE 4041 - Senior Design</td>
</tr>
<tr>
<td>8. Write project documentation intended for a non-technical audience</td>
<td>IE 501 - Developments in Operations Research</td>
</tr>
<tr>
<td>a) Description of problem</td>
<td>IE 501 - Dynamic Systems and Models</td>
</tr>
<tr>
<td>b) Description of modeling and solution approaches for non-technical audience</td>
<td>IE 501 - Mathematical Models in Operations Research</td>
</tr>
<tr>
<td>c) Summary of conclusion, insights, and recommended actions</td>
<td>IE 501 - Optimization I</td>
</tr>
<tr>
<td>9. Represent self professionally, both in written and oral forms</td>
<td>IE 501 - Simulation</td>
</tr>
<tr>
<td>10. Appropriately integrate visual aids (graphs, networks, charts, tables, flow charts) into project documentation</td>
<td>IE 501 - Production &amp; Inventory Control</td>
</tr>
<tr>
<td>11. Communicate among a project team using web-based collaborative tools</td>
<td>IE 501 - Project Management</td>
</tr>
<tr>
<td>12. Create team-written documents</td>
<td>IE 501 - Stochastic Models</td>
</tr>
<tr>
<td>13. Write according to faculty-approved style guidelines</td>
<td>IE 501 - Optimization II</td>
</tr>
<tr>
<td>14. Represent self professionally, both in written and oral forms</td>
<td>IE 501 - Production &amp; Inventory Control</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fall (Soph.)</th>
<th>Spr (Soph.)</th>
<th>Fall (Jr.)</th>
<th>Spr (Jr.)</th>
<th>Fall (Sr.)</th>
<th>Spr (Sr.)</th>
</tr>
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<td>IE 4011 - Project Management</td>
<td>IE 4041 - Senior Design</td>
<td></td>
</tr>
</tbody>
</table>
WEC in African American & African Studies

June 2014
Walt Jacobs, WEC Liaison
AA&AS faculty = diverse
• 10 faculty/full-time instructors: literary scholars, language scholars, historians, sociologists, a developmental economist, and a novelist
• Strong allegiances to traditional disciplinary-based approaches

AA&AS majors = mighty but small (and late)
• 5-7 majors graduate annually
• 50% declare major in senior year

AA&AS curriculum = beyond flat: concave
• No-prereqs
• Majors and non-majors in all classes except senior seminar
• 5 concentration areas (majors can take courses from any)
• Required senior capstone class (25+ page research paper)
What challenges emerged as the AA&AS faculty engaged in discussions about integrating writing into their curriculum?
You’re the WEC consultant: What would you do?

Consult with one or two colleagues (after introducing yourself): 4 minutes

From the AA&AS writing plan:

Our writing plan is centered on a "toolkit" of

- **diagnostic assignments** that
  
  a. reveal where the students in each class are in terms of our articulated writing abilities
  
  b. assess/identify to what extent student performance is matching the department's articulated writing abilities

- **procedures** that instructors could use to address gaps.

Principles

- widely and explicitly **sharing writing expectations** with students
- employing **devices to become more intentional** in writing instruction
- thereby **creating efficiencies** based on the instructor's goals for the course.
- using a **class-by-class approach** fits with the department's philosophy of meeting students where they are.

• 17 diagnostic/improvement procedures initially developed by a grad RA.
• More info: [http://aaas.umn.edu/ugrad/writingplan.html](http://aaas.umn.edu/ugrad/writingplan.html)
Writing Author-Centered Summaries

What is this tool?  This tool presents an approach to practicing analytical voice and teaching students how to smoothly integrate textual sources into student writing.

Why might you find this tool useful?  Students often fall into the temptation of masking their own voices with that of experts in the field. This tool allows students to practice how to smoothly integrate their own voice with the voices of experts in the field. It also veers them away from plot summary. This tool can be a useful part of preparing a response or position paper, annotated bibliography, writing a concise statement of the main idea, or establishing the context of an argument. Read one (1) of the following texts by W.E.B. Du Bois: Norton AA: "A Litany of Atlanta," "Song of the Smoke," and "Two Novels."

Prompt: Write a five-sentence author-centered summary on the text you selected. Your audience for this assignment is a peer who has not read the essay. Tell your audience what the author is doing in the text. Be sure to use author tags whenever relevant (e.g. "DuBois argues," "Angelou describes" "Louis Gates observes, etc.)

Evaluation: Check system