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WEC

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CURRICULUM

I.   Writing Plan Cover Page

Please fill in the gray areas on this form.

2/12/15

☐ First Edition of Writing Plan

☒ Subsequent Edition of Writing Plan: previous plan submitted Summer/14, First edition submitted Summer/14

Industrial and Systems Engineering
_____
WEC Unit Name

Industrial and Systems Engineering	College of Science and Engineering
Department	College
Lisa A. Miller	Associate Teaching Professor
WEC Faculty Liaison (print name)	Title
lisamill@umn.edu	612-625-7397
Email	Phone

Writing Plan ratified by Faculty
Note: This section needs to be completed regardless of Writing Plan edition.
Date: 2/13/15   If Vote: 9   /   9
                                                                                                    # yes   # total

Process by which Writing Plan was ratified within unit (vote, consensus, other- please explain):
Vote

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II.   Unit Profile: Industrial and Systems Engineering

Please fill in the gray areas on this form.

Number of Tenured and Tenure-Track Faculty:

4	Professors
1	Associate Professors
5	Assistant Professors
10	**Total**

Comments about Faculty/Instructors

Major(s) *Please list each major your Unit offers:*	**Total # students enrolled in major as of** Spring 2015	**Total # students graduating with major AY** 14-15
B.I.Sy.E.	109	12
Total:		

WEC Process	**Date**	**# participated**	**/**	**# invited**
Review and approval of plan	2/13/15	9	**/**	10
			/	
			/	
			/	
			/	
			/	
			/	

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III.   Signature Page

Signatures needed regardless of Writing Plan edition. Please fill in the gray areas on this form.

If this page is submitted as a hard copy, and electronic signatures were obtained, please include a print out of the electronic signature chain here.
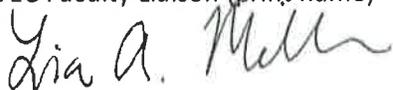
WEC Faculty Liaison

Lisa A. Miller

WEC Faculty Liaison (print name)

Signature

Associate Teaching Professor

Title

3/3/15

Date

Department Head/Chair

Shuzhong Zhang

Print Name

Signature

Professor

Title

4/3/15

Date

Associate Dean

Paul Strykowski

Print Name

Signature

Professor

Title

3/5/15

Date

For College of Liberal Arts units only:

CLA - Curriculum, Instruction, and Advising Committee approved Writing Plan on

Date

Print Name

Title

Signature

Date

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If this page is submitted as a hard copy, and electronic signatures were obtained, please include a print out of the electronic signature chain here.

WEC Faculty Liaison

Lisa A. Miller   Associate Teaching Professor

WEC Faculty Liaison (print name)   Title

[signature]

_____   3/3/15
Signature   Date

Department Head/Chair

Shuzhong Zhang   Professor
Print Name   Title

(pending)
Signature   Date

Associate Dean

Paul Strykowski   Professor
Print Name   Title

(pending)   *[signature]*   3/5/15
Signature   Date

For College of Liberal Arts units only:

CLA - Curriculum, Instruction, and Advising Committee approved Writing Plan on

_____
Date

_____   _____
Print Name   Title

_____   _____
Signature   Date

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IV. Writing Plan Narrative

Please retain section headers and prompts in your plan.

Executive Summary (1-page maximum): For what reason(s) did this unit (department, school, college) become involved in the WEC project? What key implementation activities are proposed in this edition of its Writing Plan and what, briefly, is the thinking behind these proposed activities? If this is a second+ edition of this unit's Writing Plan, please describe activities that have been successfully completed and those that are new to this edition.

The Industrial & Systems Engineering undergraduate program launched in 2013 with the offering of our first major-required undergraduate courses. As we are developing our curriculum, course content, and structure, this is an excellent opportunity to hard-wire writing into the curriculum from the beginning, rather than integrating it into pre-existing courses in a few years. We will set a high standard for writing and communication for our graduates from the very first class. In practice, Industrial & Systems Engineers frequently collaborate with people from a variety of disciplines, including technical fields like engineering and business fields, such as finance and marketing. Consequently, the ability to proficiently communicate to the audience, whether technical or non-technical audience, is a particularly critical skill for an Industrial Engineer.

Updates on Priorities from Edition 1:

The ISyE undergraduate program achieved significant progress on our initial list of priorities. At the same time, some progress on implementation of the initial writing was slower than expected due to the rapid growth of the undergraduate major. We are on schedule to complete our initial implementation in the coming year, and we are confident that new students and an expansion of our core faculty will produce increasing momentum as we move forward.

Priority (1): Consistent communication and usage of grading criteria in required courses   Faculty have begun adopting the grading criteria proposed in the first Writing Plan across courses in the curriculum. The writing expectations and grading criteria were especially emphasized in the introductory sophomore-level courses, and students are hearing the same messages in their junior courses. Additionally, the two ISyE Writing Intensive courses were offered for the first time in the 2014-2015 academic year.

Priority (2): Development of a writing guide that will be distributed to students in introductory courses and referred to throughout their ISyE studies.   Faculty have developed course-specific writing guides and grading expectations for several undergraduate courses. These guides will be the foundation for a program-wide writing guide. The hiring of a research assistant was postponed 1 year (to the academic year 2015-2016) due to TA requirements created by both our new undergraduate courses and growing enrollments. Synthesis of individual course writing guides, as well as the infusion of other materials and discipline best practices into the ISyE Writing Guide, will be the RA's primary responsibility.

Priority (3): Training of TAs and interested faculty for grading writing.   TA training will be developed during Summer 2015 and offered in the first month of Fall 2015 semester. The training will be required for all TAs.

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New Priorities for Edition 2:

As the ISyE department continues to see increased student enrollments, as well as new faculty hires, additional priorities in this edition focus on engagement of students and faculty:

Priority (4): Engage and support ISyE faculty as they begin, or continue, implementing Writing Plan elements in their courses. This will be achieved through ISyE faculty participation in Teaching with Writing workshop, as well as within a new course review process the ISyE faculty will begin in Spring, 2015.

Priority (5): Reinforce importance and relevance of writing to ISyE students. This will be achieved through the development of an Industry Panel on writing in ISyE, as well as the establishment of awards for written and oral presentation of Senior Design projects.

<u>Section 1:</u> **DISCIPLINE-SPECIFIC WRITING CHARACTERISTICS ***: What characterizes academic and professional communication in this discipline?
(no changes from Edition 1)

<u>**ISyE Writing Characteristics**</u>

Writing in Industrial and Systems Engineering is:

- Descriptive—inputs; conveying processes and data

- Analytical—emphasizing the logical examination of subject(s), decisions, constraints, and objects/objectives

- Explanatory—conveys complex technical concepts and methods and/or large amounts of data into generally comprehensible definitions and/or instructions.

- Data-driven

    o Data feeds models
    o Fact, not option, based arguments
    o Use mathematical principles
    o Logical steps
    o We use high-dimensional data sets and find what is interesting about them, as well as talk about large data sets
- Concise--excludes repetitive or extraneous information that could confuse or distract a reader.

- Collaboratively authored—work is often conducted with a team that may or may not be co-located.

---

*Adjectives, or adjectival phrases are typically most useful here, for example, "transparent to logic," (Nursing); "Analytic (versus journalistic) and argumentative" (Political Science).

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- Visual—problems, approaches, and conclusions are presented in ways suitable for oral presentations. Diagrams, graphs, networks, charts of data, etc. are used in written or oral presentations.

- Written and formatted in ways that are appropriate to the intended audience, either technical or non-technical

What types of writing are common in the professional and academic fields related to Industrial and Systems Engineering?
- Correspondence (email)
- Presentations
- Proposals
- Reports
- Graphics and visualizations of data and processes
- Articles
- Records
- Research plans
- Brief, informal responses
- Problem sets and equations
- Executive summaries

Section 2: DESIRED WRITING ABILITIES **: With which writing abilities should students in this unit's major(s) graduate?
(no changes from Edition 1)

The ISyE faculty determined the following 12 abilities for ISyE graduates. The abilities appear in bold, and additional descriptive text follows.

Industrial and Systems Engineering graduates should be able to:
1. Describe mathematical models in words, such that all necessary elements of the problem are included and that a reasonably knowledgeable person can create/replicate the model.
2. Write mathematical models in standard forms.
3. Describe the steps of an algorithm and/or utilization of a formula in a clear, concise manner, such that the algorithm or formula can be followed and applied by someone in the field.
4. Explain and justify insights and conclusions of complex analyses to non-technical audiences, such that audiences have the information they need and would be willing to take the recommended actions.
5. Synthesize and summarize key points.
6. Create clear, impactful oral presentations with visual aids (e.g. PowerPoint).
7. Write project documentation intended for a technical audience containing
  a) **Mathematical model descriptions**
  b) **Algorithm description**
  c) **Mathematical solution**
  d) **Other necessary technical details**

**Verbs or verbal phrases are typically most useful here, for example, "Take a principled, not arbitrary position" (Geography); "Visually represent designs and explain salient features of a part or concept" (Mechanical Engineering).

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such that audience is convinced of technical validity and repeatability.

8. Write project documentation intended for a non-technical audience containing
   a) **Description of problem**
   b) **Description of modeling and solution approaches for non-technical audience**
   c) **Summary of conclusions, insights, and recommended actions.**
9. Represent themselves professionally, both in written and oral forms.
10. Appropriately integrate visual aids (graphs, networks, charts, tables, flow charts).
11. Communicate among a project team using web-based collaboration tools.
12. Create cohesive team-written documents, such that team-authored documents read in one voice.

Section 3: **INTEGRATION OF WRITING INTO UNIT'S UNDERGRADUATE CURRICULUM:** How is writing instruction currently positioned in this unit's undergraduate curriculum (or curricula)? What, if any, structural plans does this unit have for changing the way that writing and writing instruction are sequenced across its course offerings? With what rationales are changes proposed and what indicators will signify their impact?

Because the majority of ISyE undergraduate courses had never been offered, we proactively integrated writing into our curriculum from the outset, rather than revising an existing curriculum.

Faculty completed grids based on knowledge of similar undergraduate and graduate courses, as well as logical thinking about which writing abilities best matched the other learning objectives of each course. They noted which abilities will be addressed and at what level (Novice, Intermediate, and Advanced) students should <u>enter</u> the specific course.

 "Novice," "Intermediate," and "Advanced" were defined as follows:
   ➢ <u>Novice</u>: students [upon beginning the course] have never done [this type of writing] before;
   ➢ <u>Intermediate</u>: students [upon beginning the course] have done this type of writing in one or two courses; and
   ➢ <u>Advanced</u>: upon entering the course, students should have experienced exposure to this ability in several courses. The instructional support will focus on enabling refinement of this ability.

In Spring 2015, faculty updated the grids based on their experiences teaching the courses. Some abilities were added or deleted, while others remained unchanged or at a revised level. The course IE 3522-Quality Engineering and Reliability, was also added to the grid.

The curriculum matrix on the next page provides an overview of how ISyE faculty and instructors plan to sequence writing and writing instruction in the new undergraduate major.

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Curriculum Matrix

Industrial and Systems Engineering Writing-Enriched Curriculum Matrix	Fall (Soph.) IE 1101 - Foundations of ISyE	Fall (Soph.) IE 2021 - Engineering Economics	Spr (Soph.) IE 3521 - Statistics, Quality and Reliability	Fall (Jr.) IE 3011 - Optimization I	Spr (Jr.) IE 3522 - Quality Engineering and Reliability	Spr (Jr.) IE 3553 - Simulation	Spr (Jr.) IE 4011 - Stochastic Models	Spr (Jr.) IE 4551 - Production & Inventory Control	Fall (Sr.) IE 3012 - Optimization II	Fall (Sr.) IE 4541 - Project Management	Spr (Sr.) IE 4041 - Senior Design
1. Describe mathematical model in words	Novice	Novice	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate		Advanced		
2. Write mathematical model in standard forms	Novice	Novice	Intermediate	Intermediate	Intermediate		Intermediate		Advanced		
3. Describe the steps of an algorithm in a clear, concise manner	Novice			Intermediate		Novice	Intermediate		Intermediate		Advanced
4. Explain and justify insights and conclusions of complex analyses to non-technical audiences	Novice	Novice	Novice		Intermediate	Intermediate	Intermediate	Intermediate			Intermediate
5. Synthesize and summarize key points	Novice	Novice		Novice	Novice	Intermediate				Intermediate	Intermediate
6. Create clear, impactful oral presentations with visual aids (e.g. PowerPoint)					Novice	Intermediate				Intermediate	Intermediate
7. Write project documentation intended for a technical audience	Novice				Novice	Novice	Intermediate				Advanced
a) Mathematical model descriptions	Novice				Novice	Novice	Intermediate				Advanced
b) Algorithm description	Novice				Novice	Novice	Intermediate				Advanced
c) Mathematical solution	Novice				Novice	Novice	Intermediate				Advanced
d) Other necessary technical details	Novice				Novice	Novice	Intermediate				Advanced
8. Write project documentation intended for a non-technical audience	Novice		Novice		Novice	Novice	Intermediate	Intermediate		Novice	Intermediate
a) Description of problem	Novice		Novice		Novice	Novice	Intermediate	Intermediate		Novice	Intermediate
b) Description of modeling and solution approaches for non-technical audience	Novice		Novice		Novice	Novice	Intermediate	Intermediate		Novice	Intermediate
c) Summary of conclusion, insights, and recommended	Novice		Novice		Novice	Novice	Intermediate	Intermediate		Novice	Intermediate
9. Represent self professionally, both in written and oral forms		Novice				Intermediate		Intermediate	Novice	Novice	Intermediate
10. Appropriately integrate visual aids (graphs, networks, charts, tables, flow charts) into project documentation	Novice				Novice	Novice	Intermediate			Intermediate	Advanced
11. Communicate among a project team using web-based collaborative tools					Intermediate					Advanced	Advanced
12. Create team-written documents	Novice							Intermediate		Intermediate	Advanced
13. Write according to faculty-approved style guidelines			Novice	Intermediate	Intermediate					Novice	Advanced

Legend:
- Novice (green)
- Intermediate (yellow)
- Advanced (red)

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The following table contains examples of writing assignments expected for each class. Note that most courses include a course project:

Example writing assignments

ISyE Course	Examples of assignments with writing
IE 1101 - Foundations of Industrial and Systems Engineering	Classical linear programs, classical dynamic programs, standard forms, EOQ model, Final exam, group project
IE 2021 - Engineering Economics	diagrams, problem sets including explanations, exams,
IE 3521 - Statistics, Quality and Reliability	problem sets, writing assignments
IE 3011 - Optimization I	problem sets, homework, tests
IE 3522 - Quality Engineering and Reliability	homework, emphasis on charting, group project with multiple deliverables, and presentation
IE 3553 - Simulation	homework, final project and presentation
IE 4011 - Stochastic Models	problem sets, project
IE 4551 - Production & Inventory Control	final project report, presentations, book review, interview
IE 3012 - Optimization II	course project, homework
IE 4541 - Project Management	Statement of Work, Master Project Plan, Status Update, Final Report, examples in class, presentations, project documentation, professional
IE 4041 - Senior Design	project report and presentation in class and to community partner, professional communication with partners

Section 4: ASSESSMENT of STUDENT WRITING: What concerns, if any, have unit faculty and undergraduate students voiced about grading practices? What, if any, new grading systems or practices are proposed, whether for individual courses or for a program? How satisfied is the unit faculty that students are adequately familiar with writing expectations? What do these expectations look like when they are translated into grading criteria? **Please include a menu of criteria extrapolated from the list of Desired Writing Abilities provided in Section II of this plan.** (This menu can be offered to faculty/instructors for selective adaptation and will function as a starting point in the WEC Project's longitudinal rating process.)
(no major changes from Edition 1)

ISyE faculty developed the following menu of grading criteria for the first Edition writing plan. The first rating of ISyE Student writing will occur in 2016.

Additionally, faculty identified several major concerns about grading:
1. Grading writing as well as grading for the correct numerical answer to a problem. This is seen as a challenge for both TAs and faculty, due to the perception of additional time required and the inexperience of applying this grading approach. For example, several faculty members voiced an opinion that well-written assignments should receive extra credit, but that assignments containing the correct numerical answer should not be penalized for poor writing.
2. Oversight of TAs when they are grading writing.

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3. Reaction of students to receiving only partial credit for numerically and technically correct answers.
4. Discerning for which assignments the writing-focused grading criteria should be utilized, versus assignments where the primary objective is for students to wrestle with complex technical material, where it is unreasonable to also expect them to focus on writing.

Menu of ISyE Grading Criteria

Section #2: What writing abilities should ISyE majors be able to demonstrate by the time they graduate?	Section #4: Include a menu of grading criteria extrapolated from the list of Desired Writing Abilities. (Faculty/instructors can select relevant criteria to use for specific assignments; the menu will also function as a starting point in the WEC Project's longitudinal rating process).
Ability **Students should be able to…**	**Translated into grading criteria:** **The text…**
1. Describe mathematical models in words	describes mathematical models in words, such that all necessary elements of the problem are included and that a reasonably knowledgeable person can create/replicate the model. This includes defining notation and identifying variables used in the model.
2. Write mathematical models in standard forms	uses standard forms for written mathematical models
3. Describe the steps of an algorithm and/or utilization of a formula in a clear, concise manner	3a. describes the steps of an algorithm in a clear, concise, and complete manner, such that the algorithm can be followed by someone in the field; and/or 3b. describes the components of a formula in a clear, concise, and complete manner, such that the formula can be applied by someone in the field
4. Explain and justify insights and conclusions of complex analyses to non-technical audiences	4a. <u>explains</u> insights and conclusions of complex analyses to non-technical audience, such that audiences have the information they need to take action 4b. <u>justifies</u> insights and conclusions of complex analyses to non-technical audiences, such that audiences would be willing to take recommended actions

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5. Synthesize and summarize key points	5a. <u>synthesizes</u> information from different sources to create a new understanding (such as a conclusion) 5b. <u>identifies</u> key points in a concise summary
6. Create clear, impactful oral presentations with visual aids (e.g. PowerPoint)	the presentation is… ● organized clearly ● practiced ● delivered with confidence ● used appropriate language (formality) ● included appropriate details, given audience's level of knowledge visual aids… 6a. support the oral presentation 6b. labeled clearly 6c. presented in large enough format to be readable from the back of the room 6d. can stand alone, such that an audience member could understand the visual aid without the oral presentation

7. Write project documentation intended for a technical audience
  a) Mathematical model descriptions
  b) Algorithm description
  c) Mathematical solution
  d) Other necessary technical details
	7. assembles necessary ingredients of project documentation intended for a technical audience such that audience is convinced of technical validity and repeatability

8. Write project documentation intended for a non-technical audience
  a) Description of problem
  b) Description of modeling and solution approaches for non-technical audience
  c) Summary of conclusions, insights, and recommended actions
	8: write project report intended for a non-technical audience such that the text:
	
	8a: describes clearly the problem to be solved in a project report for a non-technical audience
	
	8b: describes clearly the modeling and solution approaches for a non-technical audience in a project report
	
	8c: summarizes <u>conclusions</u> for a non-technical audience in a project report
	
	8d: summarizes <u>insights</u> and recommended actions for a non-technical audience in a project report

9. Represent themselves professionally, both in written and oral forms	9a: uses a tone that is unlikely to distract the target audience 9b: see #6

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10. Appropriately integrate visual aids (graphs, networks, charts, tables, flow charts)	10. integrates visual aids such that:
	
	10a: the visual aid is appropriate to the information or concept being communicated (eg, correct type of chart)
	
	10b: all data, units, and symbols are labeled
	
	10c: visual aids are readable in the intended format
	   • For presentations, text and graphics are large enough to be seen
	   • For printed reports, data is distinguishable in the prescribed printing format (Color or B&W)
	
	10d: visual aid is at appropriate place in the document or presentation and correctly labeled

11. Communicate among a project team using web-based collaboration tools	11 : criterion not necessary for this ability….#11 refers more to the overall collaboration process, and could include things like meeting minutes, brainstorming documents, team communication plans, etc.
12. Create team-written documents	12. is cohesive, such that team-authored documents read in one voice

Section 5: SUMMARY of IMPLEMENTATION PLANS and REQUESTED SUPPORT: Based on above discussions, what does the unit plan to implement during the period covered by this plan? What forms of <u>instructional support</u> does this unit request to help implement proposed changes? What are the expected outcomes of named support?

The priorities in the second and third years of the Writing Plan implementation include the first year priorities (1)-(3), plus new priorities (4)-(5):
1) Consistent communication and usage of grading criteria in required courses.
2) Development of a writing guide that will be distributed to students in introductory courses and referred to throughout their ISyE studies.
3) Training of TAs and interested faculty for grading writing.
4) Engage and support ISyE faculty as they begin, or continue, implementing Writing Plan elements in their courses. This will be achieved through ISyE faculty participation in Teaching With Writing workshop, as well as within a new course review process the ISyE faculty will begin in Spring, 2015.
5) Reinforce importance and relevance of writing to ISyE students. This will be achieved through the development of an Industry Panel on writing in ISyE, as well as the establishment of awards for written and oral presentation of Senior Design projects.

To support these implementation plans, we request the following support:

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New for Edition 2:

Objective: Faculty Engagement
- ISyE faculty attendance at Teaching with Writing workshop. We expect 2 faculty to attend each workshop in 2015 and 2016. ISyE will cover fees internally and will not request further financial support from WEC.

- The ISyE faculty is currently developing a new process for faculty to share resources and data about the courses they teach each semester. As part of this process, faculty will be asked to discuss how, if at all, they incorporated writing into the course and to provide feedback on whether students met expectations of writing abilities when they entered and completed the course. Instructors will be asked to complete a written survey about their courses, and a faculty meeting will be dedicated to sharing and discussing the feedback and strategies for improvement.

- In Year 2 of this writing plan, a workshop will be held with the WEC consultant, Faculty Liaison, and all faculty new to the department since the first edition was submitted. This objectives of this workshop are to educate the new faculty about the intent of the WEC program, the development of the Writing Plan, and to engage them in enhancements to the plan that can be integrated into the third edition.

Objective: Student Engagement
- **Industrial Panel on importance of writing in ISyE.** Funds are requested for lunch and a $200 honorarium for each panelist. The Department of ISyE has an active 10-member Industrial Advisory Board, as well as a database of over 20 additional industry affiliates who have indicated their willingness to engage in departmental activities. Panelists will be selected from these groups to represent a variety of industries and level of positions (entry-level, mid-level, and senior-level).The panel will be conducted in conjunction with another yet-to-be determined departmental or student-group led activity in Spring, 2016, to maximize attendance.

  The panelists will be asked to bring samples of writing from their work: emails, presentations, reports, etc. to share with students, and to discuss the benefits of strong writing in their roles. These samples will also drive a writing workshop in the Spring of 2016, Senior Design course, where groups of students will be asked to assess and critique each sample.

- **Establishment of ISyE Writing Enriched Curriculum Awards** for best written report and best presentation in conjunction with Senior Design projects. The criteria for these awards will mirror Writing Abilities 6-8. The ISyE faculty advisors and industry mentors of that semester's design projects will serve as the judges.

  For the written award, we plan to ask each faculty advisor to read 3 team reports and assess their demonstration of the ISyE writing abilities. 5 finalists will be selected from these ratings, and all faculty advisors will read and select an overall winner. One group will be selected as the winner of the $200 award.

  For the presentation award, all faculty and industry mentor in attendance for Senior Design presentations will rate each group presentation based on a rubric developed from the ISyE

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writing abilities. Based on overall ratings and group deliberation, one group will be selected as the winner of the $200 award.

The department will seek an industry sponsor or sponsors to continue this award beyond the term of the WEC funds.

- **Conversion of written ISyE writing guide to online tool.** An RA will be hired in Year 2 of this writing plan to translate the ISyE writing guide to an online system. We envision a tool similar to that developed by Construction Management, organized by writing genre. ISyE instructors can link to relevant sections within their class materials. Because ISyE faculty tend to teach the same courses again and again, there will be motivation for faculty to provide input into materials that will best meet the needs of students in their courses.

Updates from Edition 1:

- **Development of a Student ISyE Writing Guide**: A 25% RA will create this guide, which will contain faculty-approved writing guides, including examples of each of the writing abilities, as well as the menu of grading criteria. This guide will be introduced to students in an introductory course, such as IE 1101, and then referred to by faculty as necessary throughout the curriculum. The RA will be selected prior to Fall 2015 during the department's TA assignment process. The ISyE Faculty Liaison, Lisa Miller, will supervise the RA and provide guidance and feedback on the development of the ISyE writing guide. *(Edition 2 Update: Funding approved in Edition 1 was pushed to 2015. RA will start in Fall 2015).*

- Funds to print and bind 250 copies of the ISyE Writing Guide, to be distributed to sophomore students in IE 1101, junior students in IE 3011, seniors in IE 4541W, and to faculty and TAs. Students at all 3 levels will be issues this first edition of the writing guide. Future WEC funds will be requested to print and bind copies to issue to new ISyE students in IE 1101 in Fall, 2016.

  (Edition 2 Update: Funding was approved in Edition 1. Guide will be first printed and distributed Fall 2016. Additional funds are requested in this Edition to migrate the guide to an interactive website in 2016-2017).

- Workshop for TAs and interested faculty in the first month of the Fall, 2015 semester.   The workshop will be 1.5 hours, and will be co-led by Dan Emery and Lisa Miller. The workshop will focus on the importance of writing in the ISyE curriculum and how TAs and faculty can support our writing objectives. Example topics include reviewing the ISyE Writing Characteristics, Abilities, and Grading Criteria, using the Writing Plan and samples, as well as several rounds of practice grading using different forms of student writing (e.g. problems sets, non-technical project documents, and technical project documents).

  The standard WEC feedback cards will be used at the end of the workshop to gather feedback on the session and assess needs for future support for TAs.

Section 6: PROCESS USED TO CREATE THIS WRITING PLAN: How, and to what degree, were stakeholders in this unit (faculty members, instructors, affiliates, teaching assistants, undergraduates, others) engaged in providing, revising, and approving the content of this Writing Plan?

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The faculty liaison held individual conversations with faculty to understand how their implementation of the writing plan was working. In consultation with Pamela Flash, she developed this edition of the writing plan from this faculty input, and the draft plan was reviewed in our 2/13/15 faculty meeting. The new edition was unanimously approved.

Section 7: Briefly, please describe the ways that the ideas contained in this Undergraduate Writing Plan address the University's Student Learning Outcomes (http://www.slo.umn.edu).

As the following chart indicates, the Writing Plan addresses all seven of the University's Student Learning Outcomes

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Student Learning Outcomes

Writing Ability	Can identify, define, and solve problems	Can locate and critically evaluate information	Have mastered a body of knowledge and a mode of inquiry	Understand diverse philosophies and cultures within and across societies	Can communicate effectively	Understand the role of creativity, innovation, discovery, and expression across disciplines	Have acquired skills for effective citizenship and life-long learning.
1. Describe mathematical models in words	x	x			x		
2. Write mathematical models in standard forms	x				x		
3. Describe the steps of an algorithm and/or utilization of a formula in a clear, concise manner	x		x		x		
4. Explain and justify insights and conclusions of complex analyses to non-technical audiences	x	x	x		x		
5. Synthesize and summarize key points		x	x		x		
6. Create clear, impactful oral presentations with visual aids (e.g. PowerPoint)		x	x		x	x	x
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		x		x		
8. Write project documentation intended for a non-technical audience a) Description of problem b) Description of modeling and solution approaches for non-technical audience c) Summary of conclusions, insights, and recommended actions	x		x		x	x	
9. Represent themselves professionally, both in written and oral forms					x		x
10. Appropriately integrate visual aids (graphs, networks, charts, tables, flow charts)		x			x	x	
11. Communicate among a project team using web-based collaboration tools				x	x		x
12. Create team-written documents					x		x

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V. WEC Research Assistant (RA) Request Form

This form is required if RA funding is requested. If no RA funding is requested please check the box below.

☐ No RA Funding Requested

RAs assist faculty liaisons in the WEC Writing Plan implementation process. The specific duties of the RA are determined in coordination with the unit liaison and the WEC consultant, but should generally meet the following criteria: they are manageable in the time allotted, they are sufficient to their funding, and they have concrete goals and expectations (see below).

RA funding requests are made by appointment percent time (e.g., 25% FTE, 10% FTE, etc.). Appointment times can be split between two or more RAs when applicable (e.g., two 12.5% appointments for a total of 25% FTE request). Total funds (including fringe benefits when applicable) need to be calculated in advance by the liaison, usually in coordination with administrative personnel.

Please note that, outside of duties determined by the liaison, WEC RAs may be required to participate in specific WEC activities, such as meetings, Moodle discussion boards, and surveys.

RA Name (Use TBD for vacancies): TBD
RA Contact Information: email_____, phone_____
Period of appointment (Semester/Year to Semester/Year): Fall/2015 to Spring/2017
RA appointment percent time: 25%

Define in detail the tasks that the RA will be completing within the funding period:
Fall/2015 to Spring/2016:

1. Gather existing faculty-created writing guidelines

2. Catalog types of writing assignments in each undergraduate course

3. Research existing writing resources available through other universities and departments

4. Synthesize findings into written writing guide.

5. Share with faculty and a sample of students for feedback.

6. Revise writing guide.

Fall/2016 to Spring/2017:

1. Gather feedback from faculty on first edition writing guide.

2. Design structure of online writing guide.

3. Develop online guide.

4. Share with faculty and a sample of students for feedback.

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5. Revise online writing guide.

Define deadlines as applicable (please note that all deadlines must be completed within the funding period):
May, 2016: Completion of first edition ISyE Writing Guide

December, 2016: Design and template created for Online ISyE Writing Guide

May, 2016: Completion of Online ISyE Writing Guide

Describe how frequently the RA will check in with the liaison:
Biweekly

Describe in detail the RA's check-in process (e.g., via email, phone, in-person, etc.):
In-person meeting bi-weekly, plus emails as needed to stay on track.

WEC

V. WEC Writing Plan Requests

Unit Name: **Industrial and Systems Engineering**

Financial Requests (requests cannot include faculty salary support) *drop-down choices will appear when cell next to "semester"is selected*

Total Financial Request: **$21,697.71**

Semester 1: Fall 2015		Semester 2: Spring 2016		Semester 3:		Semester 4:		Semester 5:	
Item	Cost	Item	Cost	Item	Cost	Item	Cost	Item	Cost
		Honorarium for Panelists	$1,000.00					Honorarium for Panelists	$1,000.00
		Refreshments for panel discussion	$400.00					Refreshments for panel discussion	$400.00
		ISyE WEC Awards	$400.00					ISyE WEC Awards	$400.00
						25% Graduate research assistant	$9,095.26	25% Graduate research assistant	$9,002.45
Semester 1 Total:	**$0.00**	**Semester 2 Total:**	**$1,800.00**	**Semester 3 Total:**	**$0.00**	**Semester 4 Total:**	**$9,095.26**	**Semester 5 Total:**	**$10,802.45**

Rationale for costs and their schedule of distribution

Industrial Panel on importance of writing in ISyE. Funds are requested for lunch and a $200 honorarium for each panelist. Funds are also requested for a new ISyE WEC Awards for best written report and best presentation for senior design projects. Each award will be $200, and the awards will be divided among members of the winning teams. A graduate RA will be hired in Year 2 to revise and migrate the ISyE Writing Guide to an online home.

Service Requests *drop-down choices will appear when a cell in the "service" column is selected*

Semester 1: Fall 2015		Semester 2: Spring 2016		Semester 3:		Semester 4:		Semester 5:	
Service	Qty	Service	Qty	Service	Qty	Service	Qty	Service	
Workshop	1					Workshop	1		
						Workshop	1		

Description and rationale for services

Fall Workshops each year for TAs and interested faculty in the first month of the Fall, 2015 semester. The workshop will be 1.5 hours, and will be co-led by Dan Emery and Lisa Miller. The workshop will focus on the importance of writing in the ISyE curriculum and how TA's and faculty can support our writing objectives. Semester 4 workshop for new faculty to educate them on the Writing Plan and engage their input for future editions.

Note: There are no items listed in Semester 6, so those columns were removed to improve readability.

Office of Undergraduate Education

March 19, 2015

To: Lisa Miller, Industrial and Systems Engineering
From: Robert McMaster, Office of Undergraduate Education
Subject: Decision regarding WEC funding proposal

The Department of Industrial and Systems Engineering recently requested the following funding to support its Writing Enriched Curriculum:

Spring 2016	Honorarium for panelists	$	1,000.00
Spring 2016	Refreshments for panel discussion	$	400.00
Spring 2016	ISyE WEC Awards	$	400.00
Fall 2016	25% Graduate Assistant	$	9,095.26
Spring 2017	Honorarium for panelists	$	1,000.00
Spring 2017	Refreshments for panel discussion	$	400.00
Spring 2017	ISyE WEC Awards	$	400.00
Spring 2017	25% Graduate Assistant	$	9,002.45
TOTAL REQUEST		**$**	**21,697.71**

All items above have been approved by the Office of Undergraduate Education, for a total of $21,697.71. Please provide Pat Ferrian (ferri004@umn.edu) with your department's EFS information within 30 days of the receipt of this letter so the funds may be transferred.

CC: Suzanne Bardouche, Molly Bendzick, Will Durfee, Dan Emery, Pat Ferrian, Pamela Flash, Leslie Schiff, Steve Wandler, Pam Wilson