TAMALPAIS UNION HIGH SCHOOL DISTRICT
Larkspur, California

Course of Study

Sustainable Agriculture 1-4

SUBMITTED 10/15/13 by Joe Stewart, Redwood High School
APPROVED 2/5/14, UC "g" approval Spring 2014
*REVISED 2/22/16 to include SustAg 3-4**

1. **Introduction**:
   Course Name: Sustainable Agriculture 1-4
   Department: Science
   Open to all grade levels (with completion of prerequisites/co-requisites):
   Sustainable Agriculture 1-2 is a two semester course with UC "g" approval.
   ** Sustainable Agriculture 3-4 is a two semester course (non-UC approved).*

   Course Description
   Sustainable Agriculture 1-2:
   Sustainable Agriculture is the science of growing food to maintain natural ecological cycles while promoting long-term environmental, nutritional, and economic viability. Students in Sustainable Agriculture learn how humanity's strongest connection with the earth is through food; a connection that is demonstrated culturally and through our impacts on natural systems. Through seasonally-dictated project-based learning and experimentation, students learn how to choose and assess food-growing locations, study and practice soil science and regeneration, address ecosystem imbalances (such as pests and weeds), cultivate plants using sustainable agricultural techniques, and consider the long and short-term feasibility and impacts of their work in functioning local and global systems. Students apply the study of historical and current agricultural methodologies to the development of individual and collaborative work on a student-managed on-campus organic farm. Work is collaborative, hands-on, project-based, and regularly involves community connections. Students assess their work based on environmental and economic sustainability, including harvest analysis and environmental and cultural impacts.

   Course tenets for the individual, community, environment, and connections:
   ***Individual:** Personalized, participatory instruction with community connections improves student learning.*
   ***Community:** Community involvement and active citizenship promotes environmental awareness and understanding.*
   ***Environment:** Agriculture provides an important context for learning about and connecting with nature.*
   ***Connections:** The interplay of the individual, community and environment all contribute to sustainable practices.*

   Sustainable Agriculture provides a hands-on science elective for students who have completed (or are concurrently enrolled in) the required two-year mandatory science curriculum to pursue interests in environmental studies, food and agriculture, and issues of conservation. The district's mission is

strongly supported through the course's focus on "meaningful learning experiences" that prepare "engaged" citizens. The project-based, skills-centered curriculum promotes a stated district strategic priority by providing a relevant alternative to traditional academic courses.

** Sustainable Agriculture 3-4:*
Sustainable Agriculture 3-4 is a second year course available to students who have completed Sustainable Agriculture 1-2 with a C or higher (or with teacher approval). Students build on and deepen their agricultural skills and knowledge. Year 2 students work independently on projects, share knowledge, and pursue mastery of all Sustainable Agriculture program goals.

2. **Justifications for course to include**:

   A. How will the course bring the Mission statement to life in the classroom?

   Sustainable Agriculture will bring the TUHSD Mission ("quoted" in the following sentences) to life. Through "meaningful learning experiences", students grow food, study how it is grown elsewhere and has been grown in the past, and learn the environmental, cultural, economic, and historical impacts of that growing. To "be prepared for engaged citizenship", students also "contribute individually and collaboratively in order to address the challenges of a dynamic and diverse world" by considering how we may continue to grow food sustainably into the future. Sustainable Agriculture students "access and critically analyze information, pose substantive questions" while experiencing how nature works and practicing its study. Students "communicate effectively" about collaborative projects that make cross-curricular connections about how food shapes our civilizations and planet. Focus is on student-driven projects that develop "creative, passionate, and self-motivated learners."

   B. In what ways does this course address student interest?

   There is strong interest in Sustainable Agriculture. One Redwood High School 9th grader said, "If you offered this course, I'd take it." An 11th grade transfer student was very excited to hear about the proposed course as she loved her agriculture class at her last school. A senior commented, "There are no courses like this currently at Redwood. It is a great opportunity to actually do the things we always just learn about in a classroom".

   Sustainable Agriculture provides a unique and coveted opportunity to get outside the classroom and pursue projects with real and genuine application in the community and beyond. This is evidenced by the over 110 students (and another 40 community members) who attended three optional farm work days (two Saturdays and a Monday after school) in the fall of 2013. During these work days, many participating students expressed interest in doing further similar work through the Sustainable Agriculture course.

   Sustainable Agriculture also supports, extends, and provides added content and meaning to academic learning done in existing courses. For example, Ecology students who have run botanical experiments in the garden often lament the lack of outlets for further plant-related learning in the existing offerings. In the fall of 2013, 66 Ecology students were polled regarding their interest in Sustainable Agriculture. Of these students, 89% reported they would have taken Sustainable Agriculture had it been offered throughout their time at Redwood High School.

In addition to Ecology students, there are others likely to be interested in Sustainable Agriculture. In Integrated Science, students study photosynthesis, agriculture and populations. When selecting electives, students often express a desire to understand more deeply how this content is applied or want an alternative with more direct applicability to their daily lives than the more traditional academic offerings. Environmental Science students who have studied the impacts of agricultural production and human population growth and consumption have minimal curricular access to participation in (instead of just learning about) sustainable solutions. A poll of 44 AP Environmental Science students found that 64% would have taken Sustainable Agriculture had it been offered throughout their time at Redwood High School.

These examples represent a significant number of district students each year who have been inspired to learn more and take action, but are frustrated with few opportunities to apply their learning in meaningful ways. Sustainable Agriculture satisfies these interests.

C. How will this course prepare students for post high school options?

Sustainable Agriculture provides important learning about food, where it comes from, how it is grown, and how that growing affects individuals, the local ecosystem, cultures, and the planet. This is important knowledge for any citizen. It is, of course, of particular importance to anyone pursuing study or career in agricultural sciences, food production, anthropology, economics, environmental sciences, health, and more. Furthermore, the level of responsibility and participation required of students in the student-run community farm are excellent and unique preparation for a future at the college level and/or in the workplace.

D. What learning need does the course meet?

Food makes us who we are and its production has far-reaching implications. Even for those not specifically interested in agriculture, we all eat food and issues of sustainability permeate not only the growing processes, but where our food comes from, how we get it, how we eat, and what we do with food when we are done with it.

E. How does this course provide a new opportunity or pathway for students to fulfill district requirements?

Sustainable Agriculture is a science elective that provides students an alternative means for earning credits towards graduation.

F. What is the need for a new course as opposed to new units of study within an existing course?

Though agriculture and sustainability are addressed in a number of existing courses, the scope of this course is well beyond an additional unit of study or two. Growing food sustainably requires a year-round exposure to and understanding of ecological and agricultural systems. Learning the background and skills to support sustainable agriculture--crop planning, composting, cultivation, harvesting--takes time and practice. In addition, participating in and observing the systems--soil building, the life cycle of a plant, decomposition--take time and patience. Learning by experience and experimentation require long-term monitoring and formative assessment. New findings must continually be applied from season to season to improve growing systems--well beyond what is available in a couple of units.

G. What are some potential impediments to this course succeeding?

Access to farmable land and community participation are essential and available land may limit section numbers. Scheduling of teachers and students must provide sufficient flexibility to allow for significant, manageable time on the campus farm and working with the community (including field trips). If included in an academy program, there would be further scheduling considerations. Some farm maintenance and repair are required of the district--at a level comparable to the upkeep of the site which predates the Sustainable Agriculture farm.

H. In what ways might this course address the needs of our various student subpopulations?

This course provides a meaningful alternative to traditional classroom instruction. The project-based nature of the course allows for support of different learning styles and levels. Furthermore, instruction is differentiated through individual, group, and workshop guidance. Students direct their own farm-based projects which makes their learning relevant. In addition, Sustainable Agriculture provides excellent opportunities for cross-curricular and multi-cultural connections. Examples of topics rich with connections include: ethnobotanical studies, agricultural techniques of native cultures, the politics of farming, agriculture in literature, food preparation methods around the world, the impact of agriculture on early civilizations, and running a sustainable farm in a modern economy.

3. **Prerequisite skills** and knowledge suggested for success in the course:

Passing grades in Integrated Science 1-4 is prerequisite to Sustainable Agriculture (with teacher approval, may be taken concurrently with IS 3-4).

Students must have an interest in and motivation to learn about food and to work the land where it comes from. Prerequisite skills include:

- *Proficiency in experimental design.*
- *Competency in data collection and analysis.*
- *Identification of the basic structures and functions of plants.*
- *Ability to diagram basic ecological energetics (food webs) and identify examples of nutrient cycling (photosynthesis/respiration, water cycle, role of soil).*

Sustainable Agriculture may be enriched with background provided by one or more of the following prior or concurrently recommended courses: Ecology, Environmental Science, AP Environmental Science. Students may also be encouraged to enroll concurrently or subsequently in Workplace Learning. Sustainable Agriculture is an ideal anchor course for an academy program that could include Science, Social Studies, English and/or other subjects.

4. List of **program goals/learning outcomes** to be met

- ***Science and Culture**: WHAT? Understand and apply the science of agriculture and principles of sustainability as they relate to energy, soil, water, plants, ecosystem, culture and environment. What is sustainability?*
  What biologic, geologic, physical, social, political, and economic factors determine the viability of

where food is grown?
What is the role of soil in sustainable agriculture and sustainable living?
What are the water and energy needs in agricultural systems?
What role does agriculture play in the ecosystem, including issues related to pests and weeds?
How has agriculture influenced (and been influenced by) human culture and biological evolution?

- ***Techniques**: HOW? Learn basic methods of sustainable agriculture as well as the interpersonal, hands-on, and project-based skills and techniques needed to establish and run a cooperative farm.*
  How is soil regenerated?
  How can adequate water needs be provided in sustainable agricultural systems?
  How can pests and weed problems be addressed sustainably and successfully?
  How can food be grown sustainably?
  What are permaculture, biointensive, organic, and other sustainable agricultural methods (cultivation, propagation, seed saving, etc.)?
  How can scientific methodology and experimentation be used to assess sustainability?
  What are the skills required to run an agricultural business?

- ***Community**: WHY? Enhance workplace and community-building skills through regular participation in classroom, farm, community, and environmental activities (for example: internships, interviews, guest speakers, expert advisors, plant and food sales, donations and marketing, field trips).*
  What are the connections between economics, politics, environment, and food?
  How can people be empowered to support sustainable living?

In addition to addressing important concepts in science (soil science, botany, hydrology, energetics, resource availability), Sustainable Agriculture students consider important connections to human systems (agrarian life, cultural evolution, capitalism, politics, environmentalism). This provides cross-curricular connections with the social sciences, including history, government, and economics. Sustainability analysis (including calculations of inputs and outputs) provide mathematical connections. Language arts connections are made through reading and analysis of text and other literary sources (SEE #7. SUGGESTED MATERIALS). As noted previously, Sustainable Agriculture's program goals have such strong cross-curricular connections; the course serves as an excellent anchor for an academy or small learning community program.

Learning progressions and proficiency scales aligned with the program goals listed above

The following proficiency scales will be utilized in the planning and assessment of the course.

Science and Culture: *WHAT? Understand and apply the science of agriculture and principles of sustainability as they relate to energy, soil, water, plants, ecosystem, culture and environment.*

Program Goal	Emerging	Proficient	Advanced
Students know…			
what sustainability is and the biologic, geologic, physical, social, political, and economic factors that determine the viability of where food is grown.	*Define sustainability and agriculture.*	*Identify human systems that promote sustainability (for example: permaculture, biointensive).*	*Explain how agriculture has influenced human culture and biological evolution and assess the long-term sustainability of various systems.*
the role of soil in sustainable agriculture and sustainable living.	*Identify components of soil.*	*Assess soil quality based on chemical and physical characteristics.*	*Understand and apply the science of agriculture and principles of sustainability as they relate to energy, soil, water, plants, ecosystem, culture and environment.*
the water and energy needs in agricultural systems.	*Describe the water and energy (sun) needs in agricultural systems.*	*Select plants appropriate for growth based on season.*	*Identify the role of soil and plant selection in sustainable agriculture and sustainable living. Consider plant origin, crop rotation needs, companion planting issues, water needs, and other factors.*
the role agriculture plays in the ecosystem, including issues related to pests and weeds.	*Identify major plant pests and why they are problematic.*	*Predict and plan for constraints in agricultural systems associated with weeds and pests.*	*Implement solutions associated with weeds and pests and assess the success of these solutions.*
how agriculture has influenced (and been influenced by) human culture and biological evolution.	*Identify abiotic, biotic, cultural components of an ecosystem.*	*Predict and plan for constraints in agricultural systems associated with biological, climatic and cultural issues.*	*Identify and assess biologic, geologic, physical, social, political, and economic factors that determine the viability of when, where, and how food is grown.*

Techniques: *HOW? Learn basic methods of sustainable agriculture as well as the interpersonal, hands-on, and project-based skills and techniques needed to establish and run a cooperative farm.*

Program Goal	Emerging	Proficient	Advanced
Students know…			
how soil is regenerated.	*Identify techniques for building soil.*	*Describe the components of compost and build soil using compost, double digging, and other techniques.*	*Assess various soil needs and propose viable sustainable options for regeneration.*
how adequate water needs can be provided in sustainable agricultural systems.	*Identify the importance of irrigation systems.*	*Identify the pros and cons of various irrigation options including hand-watering, drip, tape, overhead.*	*Assess plant water needs and create an appropriate and sustainable irrigation plan.*
how pests and weed problems can be addressed sustainably and successfully.	*Identify problems associated with weeds and pests.*	*Explain the concept of integrated pest management.*	*Assess, plan for, and respond to pest and weed issues with sustainable agricultural practices.*
how food can be grown sustainably.	*Identify the importance of harvest and successfully harvest food.*	*Measure the economic success and identify environmental impacts of a plant harvest.*	*Considering both economics and the environment, measure and analyze the long-term sustainability of a plant harvest.*
permaculture, biointensive, organic, and other sustainable agricultural methods (cultivation, propagation, seed saving, etc.).	*Plant and cultivate seeds, starters, transplants and mature plants.*	*Assess when and how to sow seeds, cultivate, prune, save seeds, propagate, graft, and harvest plants. Know basic techniques of permaculture, biointensive, organic, and other sustainable agricultural methods.*	*Design and implement a sustainable crop plan that utilizes appropriate techniques over multiple seasons.*
how scientific methodology and experimentation can be used to assess sustainability.	*Identify the role of scientific method in successful agricultural practices.*	*Design experiments to assess the long-term viability of agricultural practices.*	*Utilize experimentation to determine and implement best economically and environmentally sustainable agricultural practices.*
the skills required to run an agricultural business.	*Identify the basic tools and skills needed to successfully cultivate and harvest agricultural crops.*	*Successfully cultivate and harvest agricultural crops.*	*Demonstrate cooperative interpersonal, hands-on, and project-based skills and techniques needed to establish and run a cooperative farm. Create and implement a simple business plan to this end.*

Culture: *WHY? Enhance workplace and community-building skills through regular participation in classroom, farm, community, and environmental activities*

Program Goal	Emerging	Proficient	Advanced
Students know…			
the connections between economics, politics, environment, and food.	*Understand that food supports people and food is provided by community members doing agriculture.*	*Understand that agriculture has major environmental and cultural consequences.*	*Participate in community-building and/or awareness activities pertaining to sustainable agriculture.*
how people can be empowered to support sustainable living.	*Enhance workplace skills (planning, record keeping, organization, promptness, asset maintenance) through agricultural work.*	*Enhance workplace skills (making proposals, budgeting, marketing, client relations) through community work. Connect work with local and global sustainability issues.*	*Become involved in the community partnerships through internships, interviews, plant and food sales and marketing, and field trips.*
		Identify connections between economics, environment, and food.	*Identify, design and participate in activities promoting sustainable living (for example: internships, interviews, field trips).*

6. **Suggested scope and sequence of Curriculum**

Sustainable Agriculture follows the seasons on the campus farm. Students learn about, work on, and manage the farm all school year. Through the seasons, student learning is appropriately scaffolded as meaningful opportunities present themselves. Students work in collaborative groups and receive teacher guidance and support through workshops and lessons. Students are also encouraged to pursue learning with the larger school community and beyond. Student time commitment is comparable to that of other science courses offered by the district and students will spend the majority of their time doing "hands-on" work. Units are anchored by meaningful and relevant projects that require research, planning, assessment, and presentation.

Semester 1:
Introduction to Sustainable Agriculture and Plants*: Establishing a Farm, Harvest, Plants*
Critical thinking, collaboration, creativity, risk-taking and problem solving: *In this unit, students are introduced to the principles of sustainability and learn basic agricultural skills, particularly as they relate to plants. Students harvest summer growth from the previous season and analyze and think critically about the sustainability of this harvest.*

Water and Soil*: Soil, Water Issues, Fall Project*
Critical thinking, collaboration, creativity, risk-taking and problem solving: *Students are assigned a fall project that involves thinking critically and working collaboratively to research, select, and plant a fall crop (and creating a crop plan). Emphasis is on soil and water conservation. In collaborative*

groups and using community and instructional support, students create experiments that problem-solve the challenges and constraints of fall weather conditions. Students present their findings with the class and community—including sharing relevant agricultural methodologies (i.e. composting) and organizing a class-run community keystone event (i.e. farm tour, work day, plant sale, harvest festival). SEE APPENDIX I, SAMPLE UNIT

***Companions**: Cover crops, Integrated Pest Management, Winter Project: Plan and Start*
Critical thinking, collaboration, creativity, risk-taking and problem solving: *Students are assigned a winter project that involves thinking critically and working collaboratively to build soil while researching, selecting, and planting a winter cover crop. Students problem-solve to create crop, soil, irrigation, and integrated pest management plans. Students work in collaborative groups and participate in teacher and student-led workshops. Through community and instructional support, students address the challenges and constraints of the winter season and present their learning, plans and progress to the class.*

Semester 2:
***Food**: Environmental Issues of Food and Agriculture, Winter Project-Finish and Assess*
Critical thinking, collaboration, creativity, risk-taking and problem solving: *Students learn about agricultural systems and food production (current and historical) as well as relevant environmental impacts. This background is applied to student work on the farm. Through community and instructional support and in collaborative groups, students assess their winter planting and present findings regarding soil building and other aspects of their winter project.*

***Sustainable Systems**: Organic Farming, Permaculture, Biointensive, Life on a Farm, Farmer's Markets, Spring Project*
Critical thinking, collaboration, creativity, risk-taking and problem solving: *Students apply previous findings from the creation of their winter farm. Students thoroughly document inputs and outputs of their spring plantings and consider their results within the context of sustainability. By interviewing professional farmers, students make connections in the community that contextualize and expand their individual work. Project work includes participating in organization of a class-run community keystone event (i.e. farm tour, work day, plant sale, harvest festival).*

***Final Projects**: Sustainability, Community Connections, Final Project*
Critical thinking, collaboration, creativity, risk-taking and problem solving: *Students design final projects related to sustainable agriculture both on the campus farm and in the community. Identifying a project and designing the community component (for example: a lesson taught to elementary school students, the creation of educational signage, donation of food to a local shelter, or organizing a community work day) require experimentation, student creativity, and risk-taking. Students are encouraged to collaborate with others on their final project.*

**** Semesters 3-4***
***Year 2:** Management, Semester Project, Research Report, Lesson, Final Project*
Critical thinking, collaboration, creativity, risk-taking and problem solving: *Year 2 students participate in all relevant, ongoing, non-repetitive coursework, including taking leadership in farm management and community outreach. Students also complete four major independent projects each semester: 1) Manage and present all parts of an individual farm plot from planning to harvest. 2) Complete a Research Report on a non-repetitive, relevant topic each semester. 3) Support in-class curriculum with at least one relevant "guest" Lesson each semester. 4) Complete a Final Project each*

semester that includes a community outreach component.

7. **Suggested textbook(s), materials, equipment and resources**

How to Grow More Vegetables: (and Fruits, Nuts, Berries, Grains, and Other Crops) than You Ever Thought Possible on Less Land than You Can Imagine. Jeavons, John. Berkeley: Ten Speed; 8th Edition (2012).

Golden Gate Gardening: The Complete Guide to Year-Round Food Gardening in the San Francisco Bay Area and Coastal California, Pam Pierce. Seattle, WA: Sasquatch Books; 3rd Edition (2010).

(SEE APPENDIX III, BOOK APPROVAL FORM)

In addition, students have access to online resources and classroom research materials including:

Silent Spring, Rachel Carson
You Can Farm, Salatin
Omnivore's Dilemma, Pollan
Sowing Seeds in the Desert, Fukuoka
Epitaph for a Peach, Masumoto
Guns, Germs, and Steel (excerpts), Diamond
Permaculture: A Designer's Manual, Mollison
Gardening at the Dragon's Gate, Johnson
Western Garden Book, Sunset
Sustainable Agriculture Activity Guides, UC Davis Agricultural Sustainability Institute, http://asi.ucdavis.edu/sf/edumat/saguides
The Unsettling of America: Culture & Agriculture, Berry
Current events, information (online and elsewhere)
"Symphony of Soil" (film)
"Rebels with a Cause" (film)

Other materials and equipment:
Farm site, tools, structures, irrigation and fencing
Classroom meeting site
Computer tablets for on-farm journaling (pictorial and written)

Set-up costs and ongoing funding requirements do not exceed those of a typical science course in the district. Funding may be supported by the sale of agricultural goods. Scheduling flexibility promotes efficient use of the farm and beyond as learning environments.

8. **Requirements satisfied**

Sustainable Agriculture 1-2 Science elective, UC "g" approved (2014)
** Sustainable Agriculture 3-4 Science elective, district Science credit*

9. **Appendices:** to contain:

Appendix I. SAMPLE UNIT OF STUDY:

Water and Soil

Enduring Understanding:
Healthy soil and a balanced ecosystem are the bases of thriving sustainable agricultural systems.

Essential Question:
Why is the support and maintenance of ecosystem cycles central to sustainable agriculture?

Activities/Assessment Examples:
Soil Testing: Shake test, Squeeze test, Chemical test (may be partially assigned in prior units)
Soil Regeneration Technique Demonstrations and Practice: Double digging, Conservation tillage, Amending, Sheet composting (may be partially assigned in prior units), Composting.
Sustainable Agriculture Activity Guide (UC Davis): Activity 2 - Cover Crops, Grow Your Own Fertilizer
Soil in the News: Discussion on soil-related current event.
How to Grow More Vegetables: Read chapters 3-5 on water, soil, and compost.
Water Conservation Demonstration and Practice: Irrigation systems including drip, hand, and overhead
Crop Planning: What to plant and where (plant selection from previous unit).
Farm Journal and Participation Log: Students observe, photograph and document farm work.
Fall Project: Build soil and plant a fall crop. Support work with research and at least one expert community corroborator. Students create crop, soil, irrigation, and integrated pest management plans. Students record experimental data, document inputs and outputs and present findings to the class.

Appendix II. UC PAPERWORK:
UC Science Elective "g" approved, Spring 2014.

Comparable courses:
Elective "g":

Sustainable Urban Agriculture	*Arroyo Valley High School*	*Elective (Science-Biological)*

Agricultural Science	*Mission Viejo High School (and others)*	*Elective (Science-Biological)*	*Agriculture and Natural Resources*

Lab Science "d":

Environmental Horticulture Academy I	*Arvin High School*	*Laboratory Science (Biological Science)*	*Agriculture and Natural Resources*

Appendix III. BOOK APPROVAL FORM:
How to Grow More Vegetables: (and Fruits, Nuts, Berries, Grains, and Other Crops) than You Ever

Thought Possible on Less Land than You Can Imagine. Jeavons, John. Berkeley, CA: Ten Speed; 8th Edition (2012).

"How to Grow More Vegetables may be one of the most important how-to guides ever written." - Alice Waters, organic restauranter and pioneer of the Edible Schoolyard program.

Golden Gate Gardening: The Complete Guide to Year-Round Food Gardening in the San Francisco Bay Area and Coastal California, Pam Pierce. Seattle, WA: Sasquatch Books; 3rd Edition (2010).

"For vegetable gardening in the Bay Area, Golden Gate Gardening is indispensable — if you buy one gardening book, this is the one." -Michael Pollan, author of In Defense of Food and The Omnivore's Dilemma

Appendix IV. TUHSD MISSION AND CA STATE STANDARDS

Mission: THE TAMALPAIS UNION HIGH SCHOOL DISTRICT is dedicated to the development of creative, passionate, and self-motivated learners. Upon graduation, students will be prepared for engaged citizenship and able to contribute individually and collaboratively in order to address the challenges of a dynamic and diverse world. To these ends, all students will demonstrate mastery of core competencies and will be offered meaningful learning experiences to enable them to access and critically analyze information, pose substantive questions, and communicate effectively.

Ca CTE Stds: http://www.cde.ca.gov/ci/ct/sf/ctemcstandards.asp

Ca Content Stds: http://www.cde.ca.gov/be/st/ss/index.asp

UC (g) Approved for Sustainable Agriculture 1-2

BOT Approved 5/10/16