

Action items	Person responsible	Deadline
Agenda item:	Meeting with Client	Presenter: Enter presenter here

Discussion:

- Meeting on 9/13/2017 at 12:30 – 1:30, at JML 82

Conclusions:

Everyone needs to get prepared for the meeting with the client and develop a better understanding of the project so that the meeting can run smoothly and cover a large amount of information

Action items	Person responsible	Deadline
✓ Familiarize yourself with the project	Everyone	Time of Meeting
✓ Research the Project	Everyone	Time of Meeting
✓ Develop Questions for Dr. He	Everyone	Time of Meeting

Team Meeting

9/14/2017
3:30
JG 108

Meeting called by:	Group and Mentor	Type of meeting:	Group and Mentor
Facilitator:	Dev Shrestha	Note taker:	Samuel Funk
Timekeeper:	Samuel Funk		
Attendees:	Samuel F., Lucas B., Matthew J., Nate W., Sage P.		
Please read:	Team Contract		

Minutes

Agenda item:	Review of Meeting with Client	Presenter:	[None]
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Discussion:

1. Dr. Shrestha wanted to hear about what we spoke to the client about.
 - a. Project implementation, expectations
 - b. Meeting time with the client
2. Group plans to meet with the client after a design is formulated.
3. Spoke about circulating meeting minutes
 - a. Minutes will then be uploaded to OneDrive and the meeting agenda will be derived from the minutes

4. Project design:
 - a. Want continuous fluid movement with zero dead space
 - b. Use a check valve
 - i. Sensor to track CO₂ input
 - c. Implementation of a catalytic converter?
5. Dev would like us to focus specifically on the requirements that the client has requested
 - a. After the group meets the requirements, additional ideas can then be addressed
6. Light
 - a. Light bands for growth is going to mostly be within the solar spectrum
 - b. Focused on the GREEN, RED, and BROWN algae types
 - i. Can ask whoever the algae is attained from the correct frequencies of light we should use
 - ii. Use Arduino to create a program that allows for a programmed light intensity to be used

Action items	Person responsible	Deadline
✓ Formulate Design	Team	
✓ Gant Chart	Team	9/28/2017
✓ Transcript of Client interview with target specs sent to client		9/28/2017
✓ Research "Bubble Lifters"	Team	
✓ Research literature on PBR	Team	9/18/2017
✓ Log book #1 (w/review form)	Team	10/3/2017
✓ Certifications needed	Nate W., Sage W.	9/25/2017

Conclusions:

Action items were decided as a team, and individual jobs were given out. It is important at this stage that everyone is conducting research so that we can begin formulating a better understanding of the project and how we can best design a PBR.

Other Information

Special notes:

None.

Team Meeting 4

9/19/2017

2:00

GJ 108

Agenda item: Specifications and Requirements of the Project Presenter: Enter presenter here

Discussion:

- Working Bioreactor to grow algae
- Light fixture for the system that we can program the specific frequencies.
- CO₂ injector for the system

Team Meeting 5

9/21/2017

3:30

GJ 108

Meeting called by: Team Type of meeting: Mentor and Team

Facilitator: None Note taker: Samuel Funk

Timekeeper: Samuel Funk

Attendees: Dev Shrestha, Samuel Funk, Matthew Jungert, Lucas Becia, Nate Weidemeyer, Sage Pratt

Minutes

Agenda item: Mentor Update and Advice Presenter: Enter presenter here

Discussion:

- Dev thinks that this is the time to do as much project learning as possible
- Logbook check is coming up
 - Looking more for quality content rather than a large number of pages
- Research:
 - Currently looking mostly at the existing structures of PBR's
 - Nate has been looking at mainly at various pumps
 - A turbine pump will likely be enough
 - Nate suggests using a panel like setup shifting from a tubular system
 - Dev wants at least three design ideas to present to the client
 - Nutrient control for the algae
 - CO₂ for the carbon source
 - Nitrogen source needs to be figured out

Conclusions:

Enter conclusions here.

Action items	Person responsible	Deadline
✓ Prepare three design ideas to present to the client	Team	
✓ Research on nutrient requirements of the algae	Samuel, Matthew, Lucas	
✓ Refine Nate's design idea, Draft up a representation	Nate	9/26/2017
✓ Finish the documentation on OneDrive – Client meeting transcript	Team	9/28/2016

Action items	Person responsible	Deadline
✓ Continue work on the Excel matrix of project specifications	Team	9/28/2017
✓ Complete the Class Survey	Team	9/31/2017

Team Meeting 6

9/26/2017

2:00 PM

GJ 108

Meeting called by: Team

Type of meeting: Design

Note taker: Samuel Funk

Timekeeper: Samuel Funk

Attendees: Samuel Funk, Nate Weidenmeyer, Matthew Jungert, Sage Pratt, Lucas Becia

Minutes

Agenda item: Design Ideas

Presenter: Enter presenter here

Discussion:

Nate Prepared two Solid works designs:

- Cylindrical:
 - Large settling tank diameter
 - High propensity for dead spots in flow
- Square:
 - Two panels that come together with stainless steel frame
 - Detachable top
 - Inserts to control fluid circulation to limit dead spots
 - Insert lights or integrate them into frame
 - Front panel/ door latches closed for easy removal
 - Top latches down for seal and cleanup
 - Swivel stand for cleanup and transportation
 - Easily alterable dimensions
 - Possibility of an external filtration/ pump module/ cultivation chamber
- Nutrients
 - Peristaltic pump or a solenoid valve for nutrient implementation
- Sensors needed
 - Ph
 - Thermometer
 - Conductivity
 - Ammonia (MONEY MONEY MONEY)
 - O₂ Sensor (MONEY MONEY MONEY)

Action items	Person responsible	Deadline
✓ 3-D print a preliminary design	Nate and Lucas	10/5/2017
✓ Calculate the pore size for most efficient CO ₂ bubbling to have enough lift for flow.	Team	10/5/2017
✓ Get the book: Airlift Bioreactors	Sage	10/5/2017
✓ Figure out the concentration of CO ₂ needed in the system	Team	10/5/2017
✓ Determine the necessary flow rate for algae circulation	Team	
✓ Research materials used in photo bioreactors	Sam, Lucas, Matthew	
✓ Investigate Algae	Sam, Lucas, Matthew	

Team Meeting 8

10/12/2017

3:30

GJ 108

Meeting called by:	Team	Type of meeting:	Design
Facilitator:	Dev Shrestha	Note taker:	Samuel Funk
Timekeeper:	Samuel Funk		
Attendees:	Samuel Funk, Nate Wiedenmeyer, Matthew Jungert, Lucas Becia, Sage Pratt		

Minutes

Agenda item:	Modeling	Presenter:	Enter presenter here
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Discussion:

- Nate wants us to model the fluid flow in our device
- **Research**
 - In an article they used a temp of 27°C, a pH of 7.3 ± 1 , which was controlled by through active feedback via a pH sensor.
- **Design**
 - Dev suggest a pipe diameter of 3-4 in
- Dev wants us to put more time into the design

Conclusions:

Enter conclusions here.

Action items	Person responsible	Deadline
✓ Research on Nutrient Requirements, look into viscosity of Sam PBR fluid		10/17/2017
✓ Scan chapter 5 and upload it	Lucas	10/13/2017

Action items	Person responsible	Deadline
✓ Read chapter 5	Team	
✓ Come up with design ideas	Team	10/17/2017
✓ Enter action items here	Enter person responsible here	Enter deadline here

Team Meeting 10

11/2/2017

3:30

GJ

Meeting called by: Tea, Type of meeting: Mentor
 Facilitator: Dev Note taker: Samuel Funk
 Timekeeper: Samuel Funk
 Attendees: Samuel Funk, Nate Wiedenmeyer, Lucas Becia, Matthew Jungert, Sage Pratt, Grad Advisors

Minutes

Agenda item: Design

Discussion:

- Showed Dev that we wanted to use a concentric tube design
 - Dev was concerned about the water tight seal of the base and how we would accomplish it
 - May want to use a twisting and locking type of mechanism
 - Materials for base: 66-1 Aluminum? HDPE
 - Lights
 - Explained lights on the outside and then lights on the inside of the concentric light
 - Want to include in the program the capabilities of controlling lights being on and off
 - Sparger
 - Have it set within the bowel so it is flush, to reduce the dead space
 - Sage suggested a circular sparger
 - Don't want to use an air stone so that the
 - Top of the PBR
 - Still deciding on if we want a cap on the PBR
 - Considering on if we want to recirculate the gas that we input
 - Need to consider how to release excess O₂
 - May want to check out the JML Water Filtration device called New Tech, moving bed sand filter
 - Martin Bakker
 - Want to have an understanding of how everything will be fit together
 - Hardware
 - Prices
 - How things go together
 - Have the building of the device going before Christmas break
 - Design Review is Due November 17
 - Need to arrange a client meeting (Should be between Nov 13-17th)

- Sparger:
 - Considering air stones and centered bronze to use for the sprager as we cannot produce a sparger with holes the size enough to have even bubble distribution.
 - Baffles:
 - Lighting: This is a possible hazard area as the lights could cause electrocution, as they need to be submerged in water.
 - Thinking about LED or Fiber Optics
 - May want to also used bubbled acrylic to improve light distribution
 - Water proof LED lights should be considered.
 - Wrap LED lights on the entire tube. Then wrap a plastic sheet/shrink tube around and vacuum suck it short
 - Have extra tubes in the reactor that have LED lights on the inside of them that allow for light distribution – currently this is a favored possibility
 - Lid
 - We should support everything from the top as we will be milling it out the bottom of the reactor so that the base plate has a parabola shape
 - Ordering
 - We are ordering a 10 inch tube as the outside tube and a 2 inch tube as the interior tube.
 - Portfolio
 - Website: Need team member photos, more design aspects, more finished appearance
 - Website also currently has a bad gateway – needs correcting
 - Project summary: Seems to have a disconnect
 - Project Learning: This section is the space where we display the understanding of the project. Should we do research and decide to change specifications because of the research, we need to indicate that in this section. Section also needs specifications on what is needed for the project design, and we need to document how the project has evolved as the client’s needs change
 - The project learning should have a table including things such as: required deliverables, desired deliverables, and so forth
 - Organization of the binder and the set-up is fine.
 - Technical Data sheet: We need to develop this area
 - Billing section
 - **Take Away:** We need to have more detailed information and descriptions of what we are doing and how the project changes.

Conclusions:

Enter conclusions here.

Action items	Person responsible	Deadline
✓ Correct the Time Schedule and send to Dev and Client	Team	1/16/2018
✓ Bill of Materials	Team	1/16/2018
✓ Create a schedule of times for us to meet and work together	Sam	1/12/2018
✓ Send Sam your weekly schedules	Team	1/11/2018