**MEC3040 Module 6 HW: Introduction to biodiesel**

*Please answer in complete and punctuated sentences or by using or creating tables or charts where needed and be thorough!*

*Note that you can type your answers into this document if you wish.*

**6.1: Overview of biodiesel**

1. When did the first experimentation with biodiesel occur?

**6.2: What is oil anyway?**

2. Describe, compare and contrast the chemical structures of petroleum oils and vegetable oil.

**6.3: The viscosity problem**

3. What is viscosity?

4. How does viscosity change as the number of carbons in hydrocarbon chains increases?

5. Why happens when viscous fuels are ‘injected’ into engines?

**6.4: Biodiesel statistics**

6. What is ‘biodiesel’?

7. What were signs of success for early US driving tests fueled by biodiesel?

8. Biodiesel is used fairly widely around the globe. But in the US, how much of our vehicle fuel is biodiesel?

9. In the US, what is the potential of biodiesel to replace petro-diesel if existing food feedstock is not used?

**6.5: Transesterification**

10. What advantage does the chemical structure of biodiesel give it in comparison to petro-diesel?

11. Yields:

(a) What volume of oil feedstock becomes biodiesel after transesterification?

(b) What is the co-product formed by transesterification? What volume of that is produced?

**6.6: ‘Renewable diesel’ and ‘bio-jet’**

12. What is the chemical difference between biodiesel and ‘renewable diesel’ and what is the advantage of the latter?

**6.7: Biodiesel sustainability**

13. Why does use of corn for bioethanol increase the cost of meat while use of soy for biodiesel decreases to cost of meat?

14. Give two reasons US imports of palm and other vegetable oils have increased recently.

15. What are some of the non-fuel markets for waste oils?

16. ‘Brewer’s’ corn oil and biodiesel?
(a) Where does it come from?

(b) Is biodiesel produced from brewer’s corn oil a primary or secondary biofuel?