Improving the current dialysis system

Why is this important?
1 in 9 adult Americans have Chronic Kidney Disease
End-stage chronic kidney disease requires dialysis
Haemodialysis requires 3-5 hr treatments 3 days per week
92,000 Americans are currently on the kidney transplant waiting list

What will I do in this project?
LEARN about how your kidneys should function, what chronic kidney disease can do to them, how current dialysis systems work, and current research into improving these methods.
MODEL the waste removal of the artificial kidney and its effects on a patient’s overall health by using a numerical model in MathCAD.
DESIGN and build your own model dialysis filter unit for a haemodialysis machine. Your design will take into account different variables such as the flow rate, the filter geometry and the patient’s overall health.
TEST that filter device to see how much urea you can remove from a model “blood” solution.
SERVICE LEARNING projects will be designed by each class to either raise funds for the National Kidney Foundation or increase awareness of chronic kidney disease.

What fields of engineering is this project related to?
Chemical Engineering – introduces basic concepts of balance equations, fluid mechanics and mass transfer
Bioengineering – introduces basic concepts of artificial organs, biocompatibility, patient compliance and biotransport
Mechanical Engineering - introduces basic concepts of fluid mechanics and material science
Civil Engineering - introduces basic concepts of fluid mechanics and filtration

Who can I contact for more information?
Dr. Noelle Comolli    Dr. William Kelly    Dr. Qianhong Wu
Chemical Engineering    Chemical Engineering    Mechanical Engineering
Office: White 321    Office: White 325    Office: Tolentine 113F
Email: noelle.comolli    Email: William.j.kelly    Email: qianhong.wu
All emails are @villanova.edu

Check out our Facebook page - Villanova Kidney Project