Outline:

Use selected on-line articles to explore current issues related to crypto currencies such as BitCoin. A focus for learning is: the underlying technologies, impacts on society, and impacts on the environment.

Objectives:

* C1.4 describe how electronic access to information influences our everyday lives.
* C2.1 describe the negative effects of computers and computer use on the environment.
* C3.1 describe legal and ethical issues related to the use of computers.

**Level 1: Cryptocurrencies & Blockchains**

Read the following resources before answering the questions below:

* <https://www.investopedia.com/tech/most-important-cryptocurrencies-other-than-bitcoin/>
* <https://www.investopedia.com/terms/b/blockchain.asp>
* <https://www.cryptoandgamers.com/>

1. What is a “cryptocurrency” and how are “cryptocurrencies” different from traditional currencies (money)?

Cryptocurrency is digital currency where encryptions are used to regulate the generation of units, transfer of funds and etc. It is basically online currency. The main difference between these currencies since it is online money (virtual) and traditional currency is physical money.

1. BitCoin is the leading cryptocurrency that most people know. What are some other cryptocurrencies and what are their unique features?

There is Litecoin (LTC) which “is based on an open source global payment network that is not controlled by any central authority and uses "scrypt" as a proof of work, which can be decoded with the help of CPUs of consumer grade”. There is Ethereum (ETH) which “is a decentralized software platform that enables Smart Contracts and Distributed Applications (DApps) to be built and run without any downtime, fraud, control or interference from a third party. The applications on ethereum are run on its platform-specific cryptographic token, ether. Ether is like a vehicle for moving around on the ethereum platform, and is sought by mostly developers looking to develop and run applications inside ethereum, or now by investors looking to make purchases of other digital currencies using ether”. There is Zcash (ZEC) which “offers privacy and selective transparency of transactions. Thus, like https, zcash claims to provide extra security or privacy where all transactions are recorded and published on a blockchain, but details such as the sender, recipient, and amount remain private. Zcash offers its users the choice of “shielded” transactions, which allow for content to be encrypted using advanced cryptographic technique or zero-knowledge proof construction called a zk-SNARK developed by its team”. There are many others but these are the top 3.

1. “Blockchains” are the basic technology behind cryptocurrencies and other emerging technologies. Explain blockchains work with respect to:
   1. What they store

Blocks store information about transactions like the date, time and cost, they store information about who is participating in transactions, they store information that distinguishes them from other blocks. Each block has a unique code called a “hash” that lets us tell it apart from every other block.

* 1. How they work

When a block stores new data it is added to the block chain, the block chain consists of multiple bocks strung together, for a block chain to occur four things must happen, a transaction must occur, the transaction must be verified, the transaction must be stored in a block and that block must be given a hash.

* 1. How they are secure and private

They are private since there is no access to identifying information about the users making transactions, although they are not completely anonymous, personal information, about users is limited to their digital signature, or username. Blocks are always added to the end of the block chain, they are stored linearly and chronologically. After a block has been added to the block chain, it is very difficult to go back and alter the contents of the block. This is since each block has its own hash. Hash codes are created by math functions that turn digital information into a string of numbers and letters, if the information is altered the hash code changes. If a hacker tries to edit your transaction from amazon so that you have to pay twice, once they edited the dollar amount, the blocks hash will change. The other block will still contain the old hash, and the hackler would need to update that block in order to cover their tracks, doing so would changes that blocks hash and the next and so on. Also, if an hacker wanted to attack the block chain, they would need to solve complex computational math problems at 1 in 5.8 trillion odds like everyone else trying to join a block chain network.

* 1. How they use public and private encryption keys

Private keys are used for making irreversible transactions, they are used to spend and send to bitcoins to anyone anywhere. The irreversibility is guaranteed by mathematical signatures which are linked to each transaction whenever we use the private keys to send bitcoins. Public keys are used to ensure you are the owner of an address that can receive funds and is mathematically derived from you private key. Another example of this is a school and lockers, the only person that can open your locker (public key) is you because you have your private key, which is the locker combination, even though the principal has all of the locker combinations, blockchains do not have a system storing private keys, so if you lost it, you can not get it back.

1. How does BitCoin use blockchains?

It uses blockchain to spread its operations across a network of computers, block chain allows bitcoin to operate with a central authority. This is useful because for example if you have a bank account and the bank shuts down you lose your money since the bank is the center, but if one computer shuts down on the blockchain there are still many other computers, meaning you will not lose your money.

1. What are some other real-world applications of blockchains?

It can be used to store data about other types of transactions. Also can be used to store data about property exchanges, stops in a supply chain and even votes for a candidate.

1. What are some advantages and disadvantages of blockchains?

Some advantages are it would be extremely hard to hack, is extremely helpful to store data and more. Some disadvantages are that thousands of hours of custom software design and back end programming are required to integrate blockchain to current business networks, it is also expensive, sometimes inefficient, your privacy is in risk, they are susceptible to 51% attacks and more.

1. Blockchain based games are the latest development in the gaming industry. Research the topic “Crypto Games” (google) to answer the following questions.
   1. What are some interesting Crypto Games available for Android or iPhone?

Some games that are available are Crypto fights, eye dragons, ox universe, war field and more

* 1. How are they different from conventional games?

Crypto games are focused on collecting unique assets and trading them for fun, profit or both. Conventional games are more focused on completing a task or reaching a goal.

**Level 2: Bitcoin & Society**

Read the following resources before answering the questions below:

* <https://www.cnet.com/how-to/what-is-bitcoin/>
* <https://www.independent.co.uk/life-style/gadgets-and-tech/news/bitcoin-price-fall-criminals-blockchain-anonymous-cryptocurrency-zcash-monero-dash-a8174716.html>
* <https://coincenter.org/link/why-ransomware-criminals-use-bitcoin-and-why-that-could-be-their-undoing>

1. Who created BitCoin and who owns BitCoin now?  
   it was invented by satoshi nakamoto, now there are no owners.
2. How is BitCoin created and what is "BitCoin Mining"?  
   Bitcoin are created through a mining process. It involves solving complex mathematical problems using computer software’s. Bitcoin mining is the processing of transactions in the digital currency system, in which trhe records of current bitcoin transactions known as blocks are added to the record of past transactions.
3. Can you buy BitCoin and what does it cost?  
   Users can buy and sell bitcoin from each other. To buy bitcoins, deposit your local currency to an exchange and place a bid or buy order. Or sell bitcoins by depositing them to an exchange and place a ask or sell order.
4. Why would you want to buy BitCoin and what can you use it for?  
   You would want to buy bitcoin because its value can increase, and because it can be used to buy things from more than 100,000 merchants and you can sell it for money.
5. What are the risks of using BitCoin?  
   Bitcoin is very risk since it is an investment, the value can decrease or increase.
6. How much of BitCoin business is related to criminal activity?  
   Bitcoins can be used to fund illegal activities and buy illegal products.
7. What are some of the reasons why criminals use BitCoin?  
   They use it because it is anonymous so no one can track what they do.
8. What are some of the disadvantages of BitCoin when used for criminal activity?  
   The global community is closely watching the bitcoin block chain transactions and Law enforcement can use the bitcoin block chain to track criminals, if they slip up once.
9. Many people dislike BitCoin because they think it is only good for criminal activity.   
   Is this true? Write a supported opinion paragraph (SOP) to explain your position.

I think that bitcoin is not only good for criminal activity it is useful for online transactions, making money, and the technology behind it can be used in other things. Firstly, bitcoin is extremely helpful for online transactions since it is secure and anonymous, there are only two ways to lose your bitcoin, getting scammed, or a 51% attack which is basically impossible, since hackers would have to get control of 51% of the computers mining bitcoin which is roughly around 2 million computers. Secondly, bitcoin is extremely helpful for making money on the side, “bitcoin mining is performed by high-powered computers that solve complex computational math problems (read: so complex that they cannot be solved by hand)”, when these computers do this they also earn some bitcoin. Finally, the technology behind the bitcoin, the blockchain, can be applied in many different futuristic technologies, like games, AI, computers etc. In conclusion bitcoin is not only good for criminal activity, it is useful for online transactions since it is anonymous and secure, it can be used to make money, since when bitcoin miners mine bitcoin they earn some bitcoin along with it, and the blockchain technology can be applied in futuristic technologies like AI and computers and etc.  
  
Guidelines for writing a supported opinion paragraph (SOP)

* <http://schools.peelschools.org/sec/fletchersmeadow/studentlife/OSSLTprep/Documents/Sample_%20Writing%20a%20Supported%20opinion%20paragraph.pdf>

**Level 3: Bitcoin & The Environment**

Read the following resources before answering the questions below:

* <https://www.cbc.ca/news/business/bitcoin-electricity-1.4668768>
* <https://www.cbc.ca/news/business/hut8-medicine-hat-bitcoin-mining-1.4834027>

1. What is a BitCoin “miner” and why are people concerned about BitCoin mining?  
   “Bitcoin mining is the process of adding transaction records to Bitcoin's public ledger of past transactions or blockchain.” People are concerned about it because it uses hundreds of computers that take up a lot of energy which affects the environment. Before it use to take 2.5 Gigawatts and is expected to take 3 times more at the end of the year.  
   https://www.bitcoinmining.com/
2. Why does Bitcoin mining use so much energy?  
   Bitcoin mining uses a lot energy because it uses hundreds of computers to process all of the transactions.
3. Why has Hut-8 decided to locate its facility in Alberta when its head office is in Toronto? What does the city of Medicine Hat provide that is required for mining BitCoin

Bitcoin mining does not need basic necessities, so it can be placed in Alberta and before in Toronto they could have a blackout if they took too much power but in Alberta that happening has a really low chance. The bitcoin mining facility is located right beside the new natural gas fired power plant and four wind turbines which provide a lot of energy that can be used for bitcoin mining.

1. What benefits does the city of Medicine Hat expect to see from this BitCoin facility?  
   The city expects economic benefits from the project, mainly financial benefits.
2. What concern does the city of Medicine Hat have about from this Bitcoin facility?  
   There could be a blackout because it uses a lot of energy.
3. What concern do environmentalists have about the Medicine Hat facility and about BitCion mining in general? E.g. how does BitCoin mining harm the environment?  
   They are concerned about the amount of energy consumed by bit coin mining especially since most of the electricity used in this place is produced by fossils fuels.
4. If Hut-8 wanted to build a facility in Brampton, would be in favor of this proposal. Write a SOP to justify your position.

I would not be in favor of Hut-8 building a facility in Brampton because, it takes too much energy, there are too many people in Brampton, and there is already a lot of co2 emissions. Bitcoin mining takes too much energy, it can possibly cause blackouts in the city which could lead to massive consequences like for example if traffic lights turned off and etc. There are too many people in Brampton, so many people are already using a a lot of energy in Brampton, there are homes, businesses and more, if we add a facility that takes even more than their will be blackouts, and more co2 emissions. Finally there are a lot of co2 emissions in Brampton in already, building this facility adds even more emissions which could possibly reduce the quality of air in Brampton which can have devastating effects, like if the air is too polluted then people will get sick and go to hospitals and what if hospitals run out of room or if the government has to pay to much for health insurance. In conclusion I would not be in favor of building this facility in Brampton because the facility takes too much energy which can lead to blackouts, there are already too many people and adding a facility would create even more energy usage and co2 emissions, and finally there are already a lot of co2 emissions adding more could pollute the air and affect the environment.